AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

APRIL 15, 1955

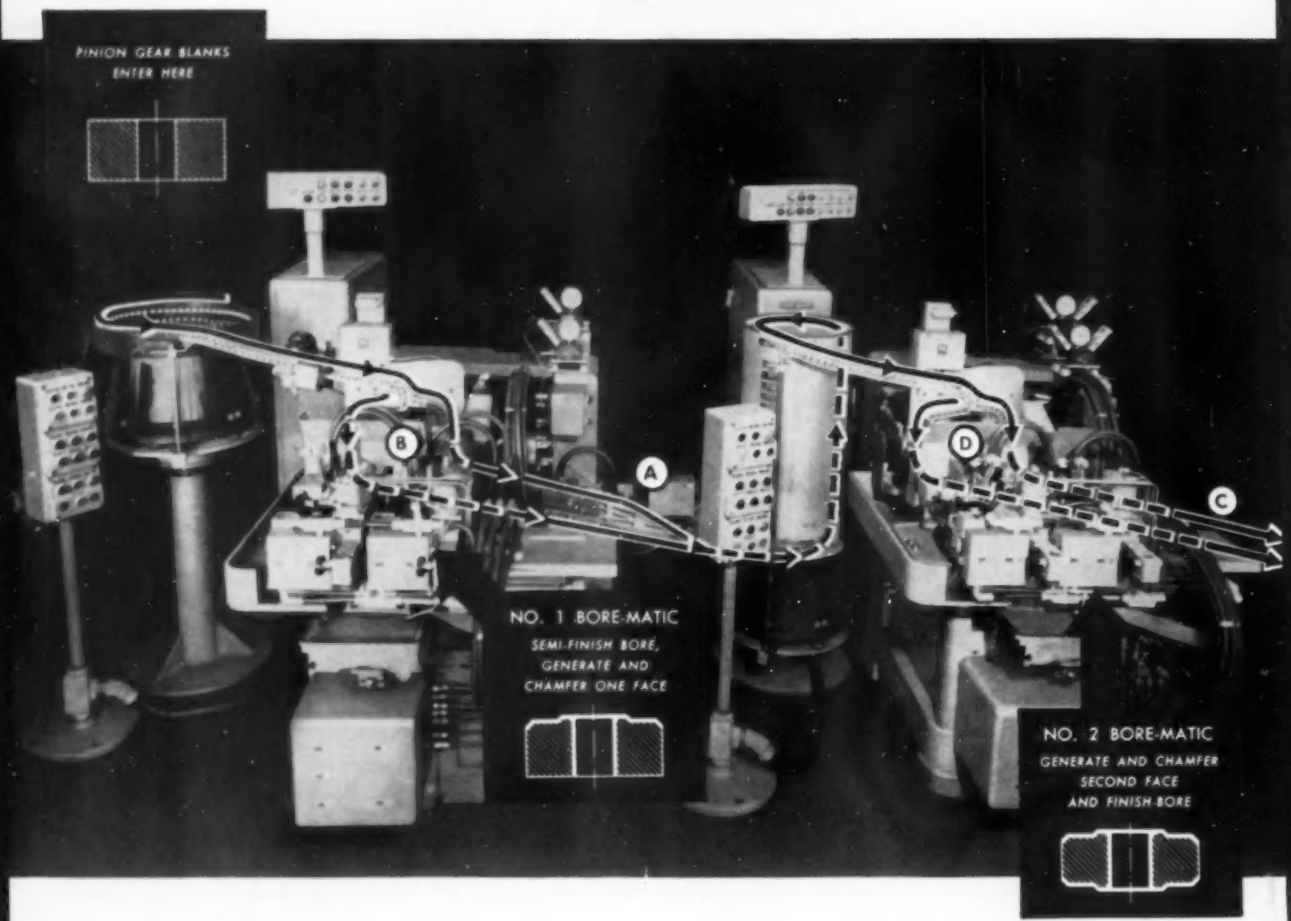
In This Issue

A CHILTON PUBLICATION

gear-blank Borizing

COMPLETELY AUTOMATED

by HEALD



THIS HEALD automated Bore-Matic installation performs every operation completely automatically – including work holding, inspection, loading, borizing, ejection, gaging, sorting and tool setting. Here's how it works.

Parts are fed from a vibrating hopper into the loading chute of Bore-Matic No. 1, where they are inspected by a "go-no-go" gage, loaded into chucks and borized two at a time to semi finish the bore and generate and chamfer the outer face. They are then fed to the gaging station at "A" where parts are simultaneously air-gaged for bore size. Gaging data from this point is fed back to the boringheads "B", automatically advancing the tool if bore is undersize or retracting it if bore is oversize. The correctly sized parts then go to the second vibrating loader for No. 2 machine, where they are faced and chamfered on the second side and finish-bored, two at a time. At sorting and gaging station "C" they are again air gaged and boring tools at "D" automatically adjusted to correct for bore size if necessary.

This installation shows how Heald engineering and equipment fit into the modern automated production line. But no matter how much or how little automation you need .... **It pays to come to Heald!**

HEALD®

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

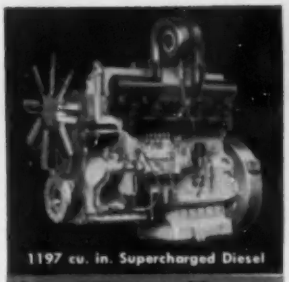
Over the Road... or Off the Highway

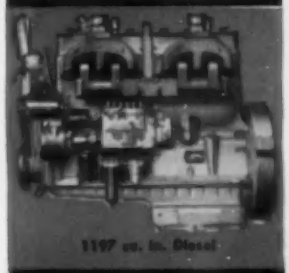
WAUKESHA

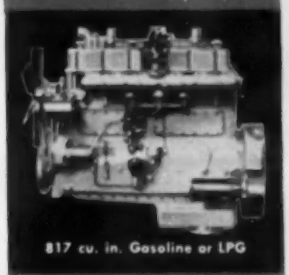
MODEL	Cyl.	*Features	Bore and Stroke	Displ. Cu. In.	Max. Torque @ RPM	Max. HP	RPM
TURBO-SUPERCHARGED DIESELS							
135-DKBS	6	ACTV	4¼x5	426	400-1800	185	2800
148-DKBS	6	ACTV	5¼x6	779	706-1800	280	2100
WAKD8S	6	ACTV	6¼x6½	1197	1062-1600	352	1800
NORMAL DIESELS							
185-DLC	6	A	3½x3¾	216	152-1200	60	2400
190-DLCA	6	AC	3¾x4	265	191-1400	85	2800
195-DLCA	6	AC	4 x4	302	221-1800	98	2800
135-DKB	6	ACV	4¼x5	426	328-1600	147	2800
148-DKB	6	ACV	5¼x6	779	584-1000	200	2100
WAKD8	6	ACV	6¼x6½	1197	845-1000	258	1800
GASOLINE							
185-GLB	6	A	3½x3¾	216	176-1400	67	2400
190-GLB	6	A	3¾x4	265	220-1200	77	2400
195-GKA	6	ACV	4⅛x4	320	243-1600	122	3000†
MZA	6	A	4⅛x4¾	404	289-1000	128	2800†
135-GKB	6	ACV	4¼x5	426	337-1200	147	2800†
135-GZB	6	ACV	4⅜x5	451	354-1200	153	2800†
140-GKB	6	ACV	4½x5½	525	425-1000	177	2600†
140-GZB	6	ACV	4⅝x5½	554	448-1100	188	2600†
145-GKB	6	ACV	5¼x6	779	595-1000	240	2400†
145-GZB	6	ACV	5⅜x6	817	630-1100	250	2400†
WAKB	6	ACV	6¼x6½	1197	1000-1000	280	1800

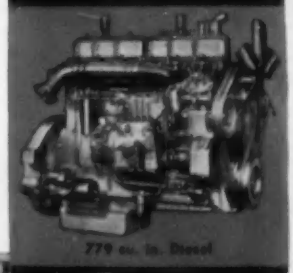
*FEATURES: A—Aluminum Alloy Pistons; C—Counterbalanced Crankshaft; T—Turbo-Supercharged; V—Vibration Dampner.

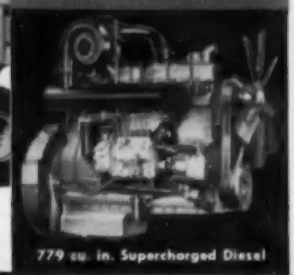
†These engines rated at higher hp and rpm for fire engine service. *Send for Bulletin 1079 for LPG ratings and complete listing of engine hp and speed ratings.*

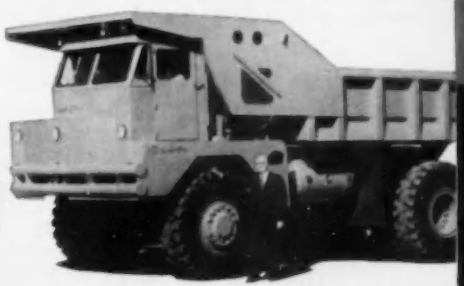

1197 cu. in. Supercharged Diesel


1197 cu. in. Diesel


817 cu. in. Gasoline or LPG

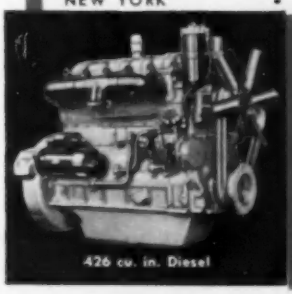

779 cu. in. Diesel


779 cu. in. Supercharged Diesel



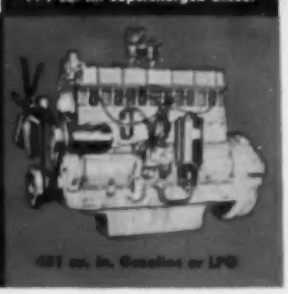
WAUKESHA MOTOR COMPANY • WAUKESHA, WISCONSIN

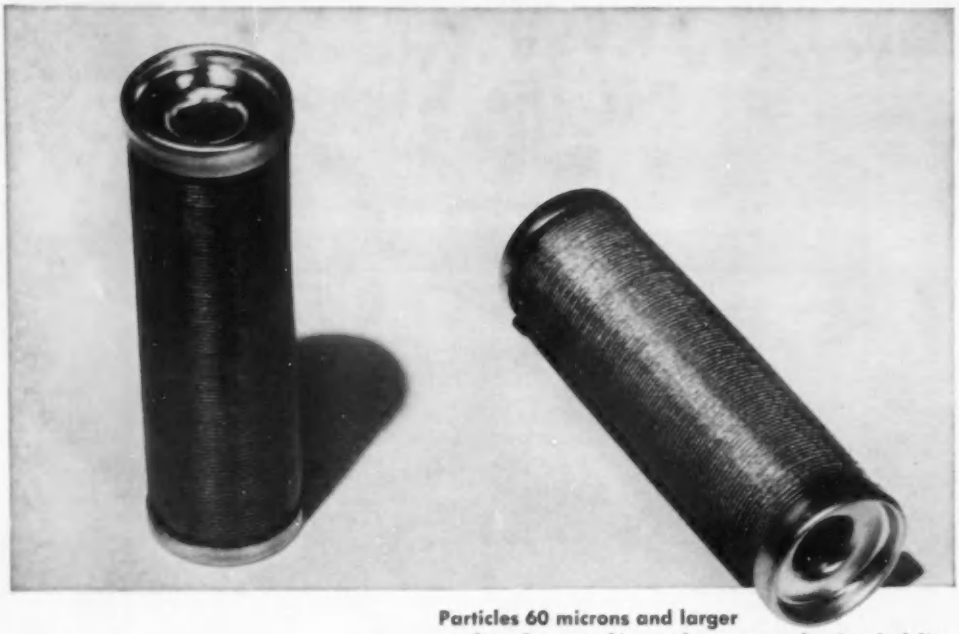
NEW YORK • TULSA • LOS ANGELES


426 cu. in. Diesel


426 cu. in. Supercharged Diesel


554 cu. in. Gasoline or LPG

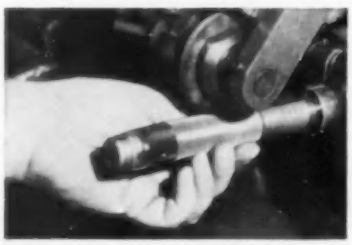

481 cu. in. Gasoline or LPG



Particles 60 microns and larger are kept from reaching carburetors or clogging fuel lines by this new filter. It's made by the Michigan Wire Cloth Company. Made economically of strong, durable Monel wire.

Low Cost Monel Fuel Filters

for a major low-priced '55 car



Wire Cloth of Monel is easily resistance-welded into fuel filter cylinder. This factor speeds production, lowers costs.

For '55 one of America's largest selling cars will have a high quality wire cloth filter at the tank end of fuel lines. It's a first in the low-priced field!

It's made of Monel wire . . . by Michigan Wire Cloth Company. Monel because . . . well, here's the story.

The cost-conscious auto manufacturer tested woven wire filters of another material first. Within four months in test cars, the filters began to gum up. (The catalytic action of the filter material was responsible.)

Then, Michigan Wire Cloth Company suggested Monel, which has been used successfully for years in marine gasoline tanks. Michigan was sure it would do this job, too.

And they had another reason for suggesting Monel. Monel is so ductile that it can be drawn to fine wire sizes and woven at minimum cost. When used in these particular filters it cost the manufacturer no more than cheaper material.

In addition to being strong, hard, corrosion-resisting and ductile, Monel is readily shaped and welded. These excellent production characteristics may enable you to use Monel to good advantage in your own products. Why not find out . . . write for our technical bulletin, *Engineering Properties of Monel.*

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

INCO NICKEL ALLOYS

TRADE MARK

MONEL® • "R"® MONEL • "K"® MONEL • "KR"® MONEL "S"® MONEL • INCONEL® • INCONEL "X"® • INCONEL "W"® • INCOLOY® NIMONIC® Alloys • NICKEL • LOW CARBON NICKEL • DURANICKEL®

AUTOMOTIVE INDUSTRIES

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APRIL 15, 1955 VOL. 112, NO. 8

FEATURES

NEWS-PREVIEWS

DEPARTMENTS

EDITORIAL STAFF

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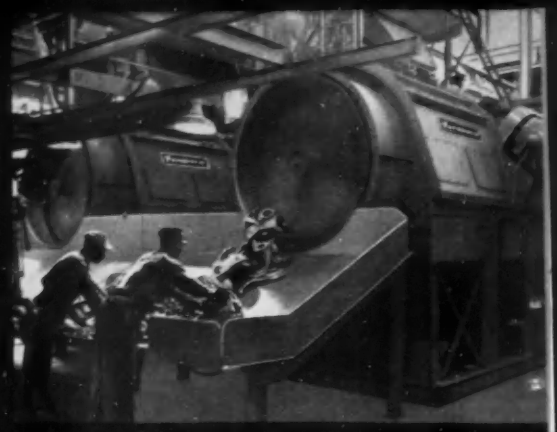
If you have



an unusual blast cleaning problem,

If you are a company with a special cleaning problem, Pangborn offers you a special service—a machine designed for your individual needs. It might be a descaling machine for bars, sheets and coils, a continuous-flow barrel or a monorail cabinet like the machines shown here . . . or it might be completely different. You may need to clean cylinder blocks, bathtubs or any unusual ferrous or nonferrous castings, forgings, stampings. If so, Pangborn engineers will study your problem and its relation to your production line. Then they'll design a Pangborn machine that gives you better cleaning and faster production at lower cost. Pangborn has proved it in hundreds of cases. Pangborn can prove it to you! Write today for Bulletin 1210 to: PANGBORN CORP., 3900 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

*U. S. Pat. #2184926 (other patents pending)

Pangborn Rotoblast* can solve it!

Pangborn

BLAST CLEANS CHEAPER

Rotoblast Blastmaster® & Continuous-Flo Barrel

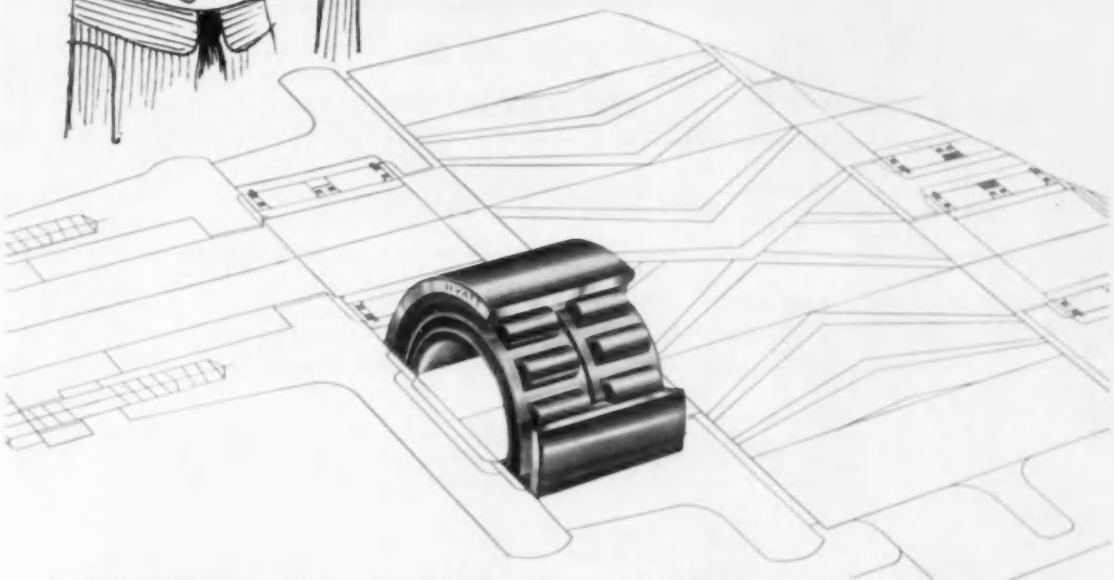
Rotoblast Tables & Table-Rooms

Special Blast Rooms & Cabinets

Pangborn Dust Control Equipment

Malleabrasive* Shot & Grit

How Hy-Loads can help you...



PROVIDE HORIZONTAL FLOAT

HY POTENUSE, the sage of the slide rule, SAYS:

your COMPLETE LINE of cylindrical roller bearings

Ever have herringbone gears bind on you because the shaft couldn't float freely to permit the gears to mate properly? It can happen when you use laterally locked bearings—*but it can't happen here!*

The designer of this pump assembly has made doubly durn sure *he* won't get into trouble—by specifying HYATT A-6200-T Cylindrical Roller Bearings. *First*, he knows they'll provide plenty of lateral float so the herringbone gears can mesh freely (and to take care of possible shaft expansion in case hot liquids are pumped). *Second*, a single bearing with two rows of rollers gives him maximum load capacity in minimum space—without any possibility of overload on one bearing or the other that might creep in if he used two separate bearings.

If you haven't a HYATT General Catalog No. 150 handy, better send for yours pronto, brother—it'll save you a heap of time and headaches! *Remember, you can't go awry when you specify—*

HYATT ROLLER BEARINGS

STRAIGHT BARREL TAPER

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

SAVE BY SWITCHING TO SUN HYDRAULIC OILS

If your system is in this condition	This is the Sun Oil recommended	And this is why
TIGHT SYSTEM. System never changed. Little or no make-up oil added.	**SUNVIS 900**	Exceptionally long life of Sunvis 900 keeps overall costs low.
TIGHT SYSTEM. Changed annually. Make-up oil added when needed.	**SOLNUS**	Solnus is a quality oil with a long life and a moderate price.
LEAKY SYSTEM without dilution. Where make-up averages 5% or more per month.	**SUNTAC**	Suntac cuts oil costs by reducing leakage an average of 35%.
LEAKY SYSTEM with dilution from water, cutting oil, emulsions and other liquids. Frequent change needed.	**CIRCO**	When frequently changed, Circo gives excellent protection at a low price.
DEPOSITS BUILT UP inside system from dust, sludge, varnish or other contaminants. Comparatively tight system.	**SUNVIS H.D. 700**	The cleansing action of Sunvis H.D. 700 removes deposits, eliminates costly tear-downs for cleaning.
DUAL PURPOSE. Machine tools designed so that hydraulic oil also lubricates ways.	**LUBEWAY**	A good hydraulic oil, Lubeway has the film strength needed to protect expensive ways.

No one oil can give greatest economy in *all* hydraulic systems. As this chart points out, the condition of the system must be considered. To make sure that the oil you select will give the maximum economy in your particular system, have a talk with your Sun Oil Company representative. Or write Department AA-4.

INDUSTRIAL PRODUCTS DEPARTMENT

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SUNOCO®

PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

Refiners of famous High-Test Blue Sunoco Gasoline

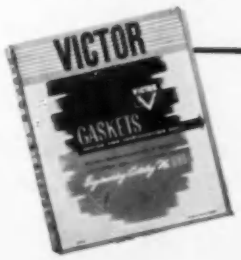
Where non-metallic or "soft" gasket materials are to be specified, design engineers will find only VICTOR with the complete line of packings for each specific need.

For automotive or aeronautical purposes, you choose from dozens of highly developed fibrous and synthetic rubber compositions—each distinctly classified by SAE-ASTM specifications . . . each a superior sealing element in recommended applications.

Technical counsel is available without obligation. Whether you specify packings in sheets or finished gaskets, your product can have the advantage of Victor's leadership in sealing engineering—without added cost.

There's a Victor Field Engineer in your area—or contact the home office. Victor Mfg. & Gasket Co., P.O. Box 1333, Chicago 90, Ill.

YOUR COMPLETE GUIDE TO GASKET MATERIALS— Victor Engineering Catalog No. 505. If you don't have a copy, please request one on your letterhead.

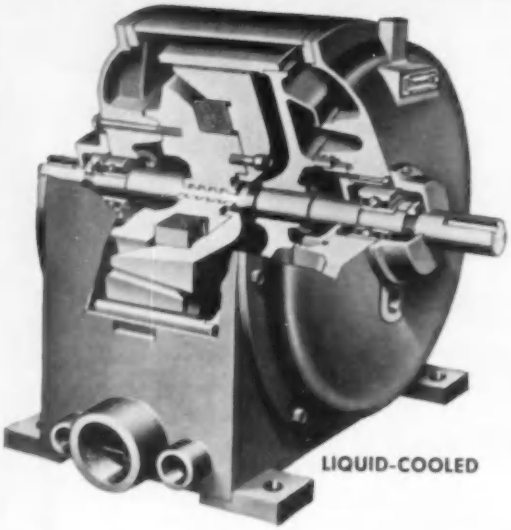


THE MARK OF QUALITY
VICTOR
LEADERSHIP THRU PIONEERING

VICTOR

"ORIGINAL EQUIPMENT"
GASKETS • OIL SEALS • PACKINGS
SEALING PRODUCTS EXCLUSIVELY

There are Hundreds of Uses for



LIQUID-COOLED

DYNAMATIC®

EDDY-CURRENT BRAKES

Wide range of torque capacities and operating speeds. Smooth, frictionless, shock-free operation. No rotating electrical components or contacts. Electronic or magnetic amplifier control from AC power.

Here Are Some Suggestions

Providing constant tension or constant linear feet per minute speed for unwind stands in metals, fabric, plastic, and paper industries.

For accurately controlling lifting and lowering functions of cranes and hoists by creating an opposed load on a wound rotor motor.

Smooth stopping of high inertia masses; precise control of deceleration with automatic or manual controls.

Providing a controlled load for the production testing of engines, transmissions, or axles.

AIR-COOLED

For Complete Information
Send for Your Copy of Our New Illustrated Bulletin No. BR-1

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MANUFACTURING COMPANY
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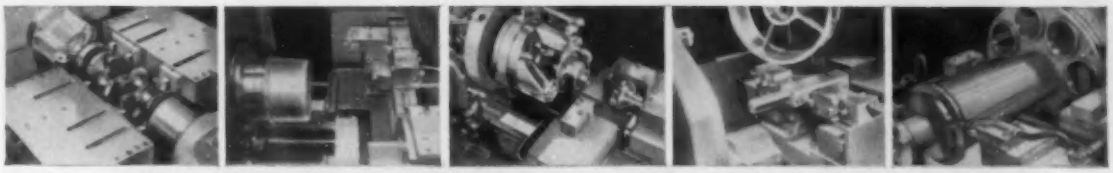
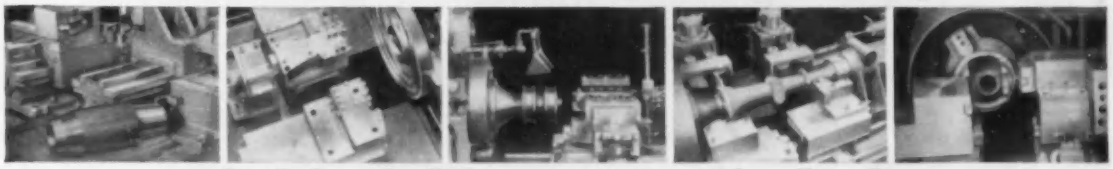


All these different tooling setups

show the amazing versatility



# of this fully automatic lathe

...the SIMPLIMATIC

Here's versatility that beats any automatic lathe you ever saw! Actually, the Simplimatic is doing hundreds of jobs like these—jobs that would otherwise be put on *special* machines—built at extra-special cost. But this (and don't miss the important point!) is a *standard machine*—at a *standard price.*

If you have medium or long runs on parts up to 33½" in diameter, get the facts about the Simplimatic Automatic Lathe.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin

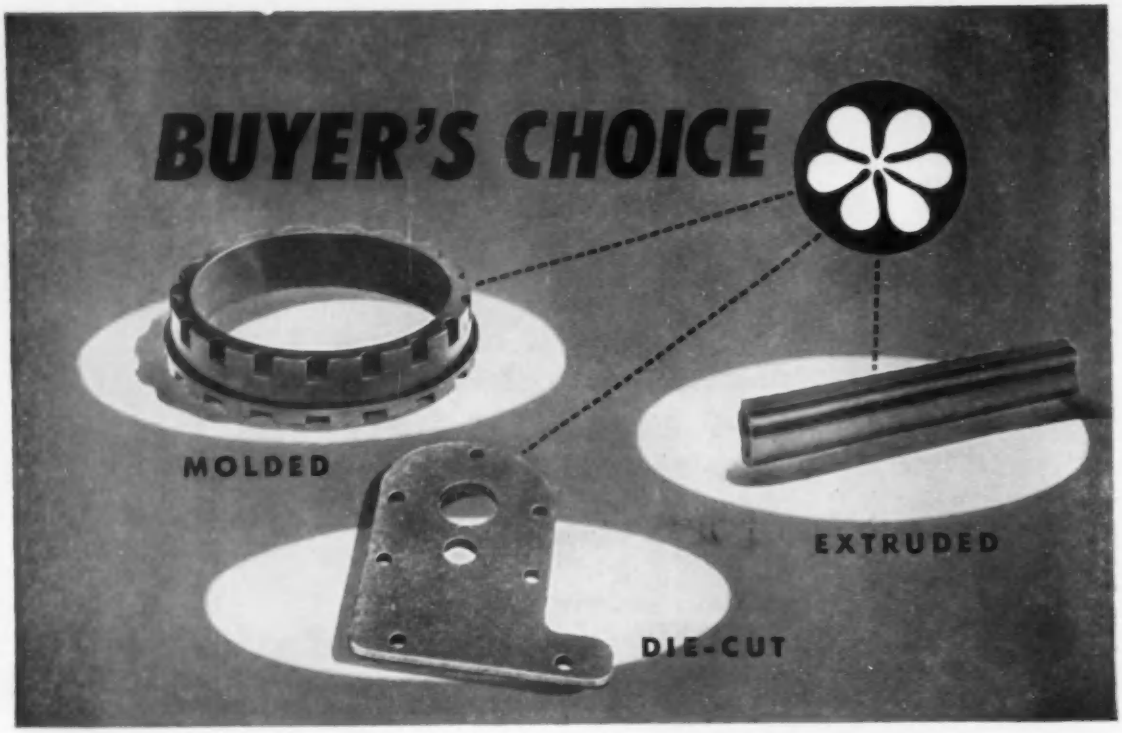
TURRET LATHES • AUTOMATIC LATHES
SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

THIS CATALOG may show you how the Simplimatic can save thousands of dollars for you as it is doing for many others. Write for your copy.

Gisholt Machine Co.
Madison 10, Wisconsin
Gentlemen:
Please send my copy of the Simplimatic Catalog.

Name.....*Title*.....
Company.....
Address.....
City.....*Zone*....*State*.....



*ACADIA SYNTHETIC RUBBER PARTS ARE MADE ALL 3 WAYS!

With Acadia you have a *choice!* Not only molded rubber . . . not only molded and die-cut . . . not only extruded rubber . . . but rubber parts any way you require! Better yet, Acadia uses whatever method the requirements of the job and you dictate is the *best* way to do it.

Acadia is especially sensitive to your specifications. We will process synthetic components for oil-resistance — good aging properties — resistance to heat — any characteristic you're seeking, or a combination of characteristics. Acadia parts are cut, molded or extruded to all required shapes, sizes and types, with almost unlimited applications.

Also, we offer Acadia SILICONE Rubber, molded or extruded for gaskets, seals, "O" rings, washers, sheets, cut-parts and packings. This is the rubber that will stay resilient at 100° *below* zero, or 500° above!

There's an Acadia Sales Engineer near you to serve you. Write us today, and we'll put him in touch with you immediately.

ACADIA Synthetic PRODUCTS

DIVISION OF WESTERN FELT WORKS
4021-4139 W. Ogden Ave., Chicago 23, Illinois
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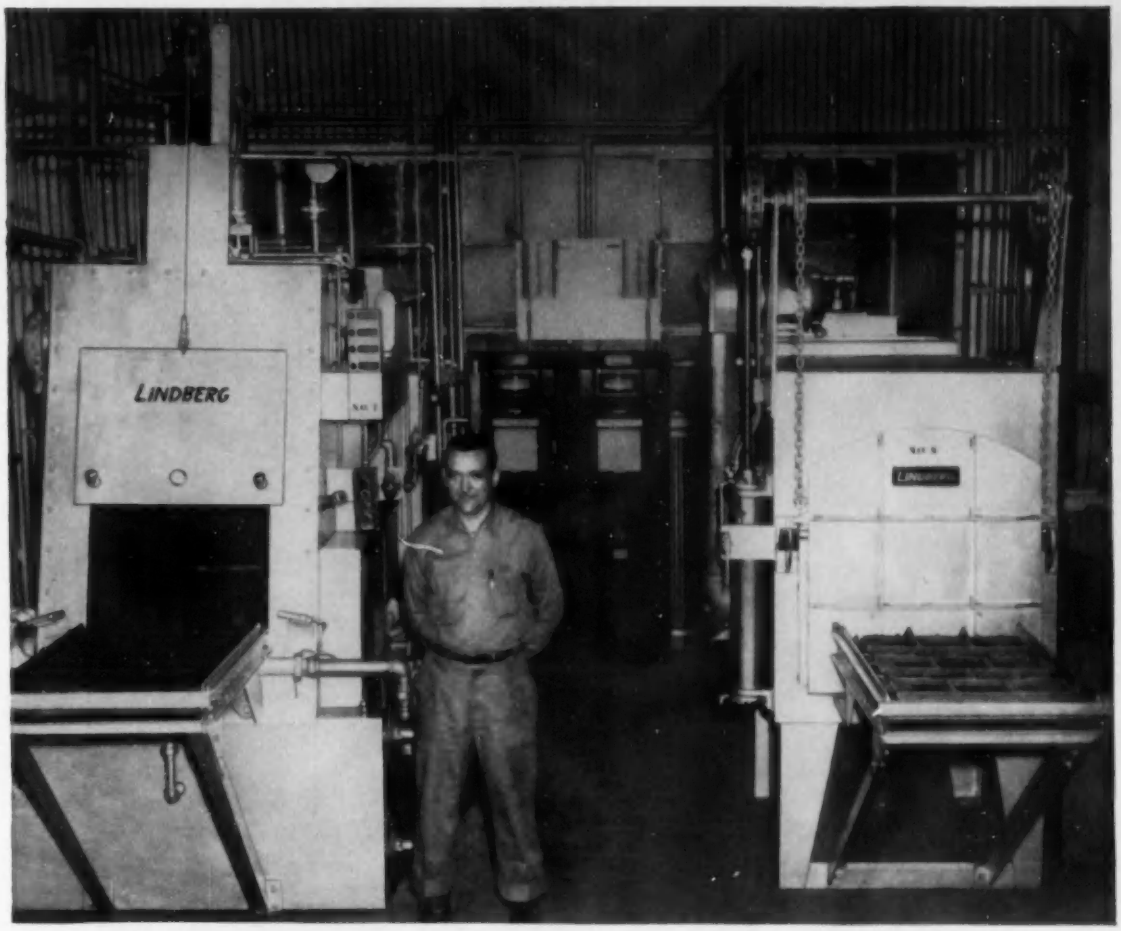
MANUFACTURERS AND CUTTERS OF WOOL FELT



VITAL QUALITY CONTROL PERFECTED WITH LINDBERG FURNACES

Carburization zero! Decarburization zero! Oxidation zero! Laboratory reports show that Lindberg Endothermic atmosphere generators maintain absolutely neutral atmospheres for production and tool steels run at Calmec Manufacturing Co., Los Angeles, California.

The Lindberg atmosphere generators and a number of Lindberg furnaces were installed by Calmec in a program to improve quality control. The results more than justified the installation of this new equipment.

Rejected parts and finishing operations following heat treating have both been substantially reduced. Parts which formerly required a heavy grind to remove distortion from heat treatment are now virtually free of warpage and can be assembled after only a light finishing operation. Important time savings have also been realized.

You can easily get results like this by using Lindberg atmosphere furnaces. We provide you with furnace atmosphere equilibrium curves to obtain precise carbon control on any type of steel.

Write for our Bulletin No. 241, or contact your nearest Lindberg field office for full details.

Wilbur R. Varney, Superintendent of the Heat Treating Division of Calmec Manufacturing Co., says:

"Since installing the Lindberg equipment, not one of the independent laboratory analyses we have received has deviated from carburization zero, decarburization zero, or oxidation zero. Our work ranges from such steels as 4130 to 52100. For aircraft areas, such as Los Angeles, this is a very important factor."

LINDBERG FURNACES

Lindberg Engineering Company, 2491 West Hubbard Street, Chicago 12, Illinois

New Holland Model 66 twine-tying baler

HAY BALER WITH A DOUBLE-ACTING DUST STOPPER

United Specialties two-stage air cleaner provides extra engine protection

Extreme dust condition encountered during hay baling can put an engine out of commission in short order. That's why New Holland protects its hay baler with a United Specialties two-stage air cleaner. This efficient unit has a pre-cleaner which traps out dust and large pieces of lint and chaff when engine air first enters the cleaner unit. Then the partially cleaned air enters the oil bath air cleaner where it is thoroughly washed in oil and enters the combustion chamber in a highly efficient state. The highly efficient purifying action of this unit safeguards rings, pistons, bearings, sleeves and cylinder walls.

United Specialties Company designs and builds a complete range of oil bath air cleaners for farm and construction equipment, cars, trucks, buses, stationary and portable power units in a wide range of both standard and highly specialized designs.

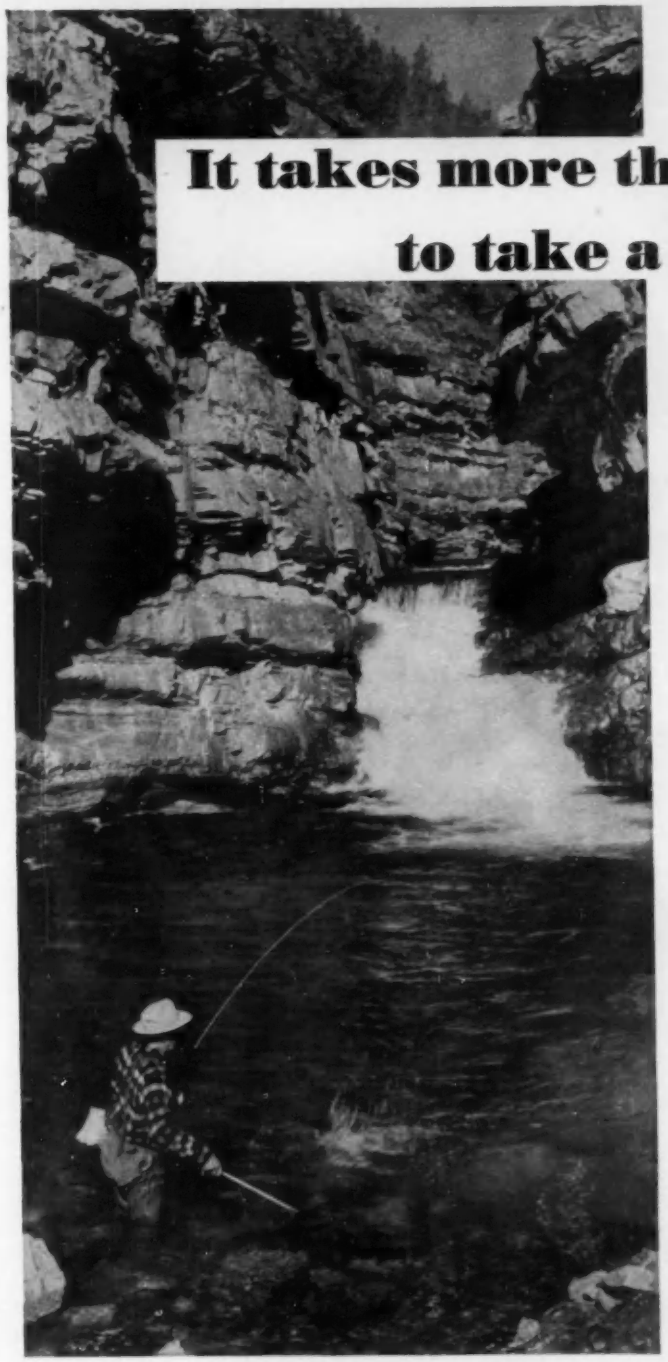
United's Mitchell Division — a pioneer in the development of turn signal switches — builds turn signal units for passenger cars, trucks and buses, ignition switches, and a complete line of rolled shapes and stampings.

Our sales engineers are helpful in providing technical information involving air cleaner design and installation problems. We invite your inquiry.

UNITED
SPECIALTIES COMPANY

UNITED AIR CLEANER DIVISION • CHICAGO 28
MITCHELL DIVISION • PHILADELPHIA 36
BIRMINGHAM 11, ALABAMA

Air Cleaners · Metal Stampings · Rolled Shapes · Ignition and Turn Signal Switches · Dovetails



It takes more than a good fly to take a trout

Even the costliest fishing gear, the finest rod, the best reel and the prettiest fly can't assure catching a wily trout. It's the experience behind these accessories, that fills the creel.

There's no substitute for "Know-How" and that's particularly true in adapting metal treating chemicals to established production. It can't be gotten out of books, through black magic or out of a crystal ball. Only years of active contact, with actual manufacturing procedures, can be depended upon for satisfactory solutions of the metal protecting problems constantly confronting manufacturers.

ACP offers ideal products for removing and preventing rust on metal, chemicals to bond paint to steel, zinc, and aluminum, and pickling acid inhibitors. In addition, ACP furnishes a free service of an organization of technical experts with over 40 years' experience in solving metal preservation problems for the largest as well as the smallest operation.

Rely on service backed by experience. You are obligated in no way by consulting our technical staff.

Write or call for further information on ACP chemicals for metal protection.

Since 1914, Pioneering Research and Development in Metal Protection

CHEMICALS ACP PROCESSES

American Chemical Paint Company

CHEMICALS ACP PROCESSES

AMBLER, PENNA.

DETROIT, MICH. NILES, CALIF. WINDSOR, ONT.

"Smoother stripping -cuts cable costs"

Allison TORQMATIC equipped Osgood dragline owned by J. C. Kitzmiller Coal Co. Unit has 3-yard bucket, 80 foot boom; strips 1000 tons of coal per month

AFTER 2,000 hours of low-cost strip-mining, veteran mine owner J. C. Kitzmiller reports "smoother stripping—reduced cable cost" due to shock-free power transmission in his Osgood dragline. The savings he's made with his Allison TORQMATIC Converter have made him decide to specify Allison TORQMATIC DRIVES in future equipment.

He's spending less for cable replacement in his Osgood dragline because the TORQMATIC Converter protects cable by absorbing sudden shock loads.

He's spending less for dragline repairs, too. The TORQMATIC Converter gives the operator time to cut off power—"throw out the drag"—when the bucket hits a snag, guards boom and drive line from harmful overloads.

And he's getting more work from his drag because with fewer repairs it stays on the job *earning* money—out of the shop *costing* money.

The TORQMATIC Converter matches engine power to load demand, helps prevent harmful engine lugging and stalling. It multiplies engine torque up to 3½ times—broadens the engine's effective horsepower range.

When load demand is equal to, or less than, engine torque the Allison TORQMATIC Converter acts as a fluid coupling to conserve fuel, boost engine life. This feature is standard equipment in every Allison Converter.

You can produce more for less with shock-free TORQMATIC power transmission in your 40- to 400-horsepower gasoline or Diesel equipment. Ask your manufacturer or dealer about TORQMATIC DRIVES in your equipment or write for more information to: Allison Division of General Motors Box 894A, Indianapolis 6, Indiana

ALLISON TORQMATIC CONVERTER

Simple Design – one-piece cast converter elements – minimum maintenance

Compact, easy to install in existing equipment

Designed for power applications in the 40 to 400 horsepower range

Longer Equipment Life – absorbs shock, eliminates harmful engine lugging, cuts maintenance costs

GM GENERAL MOTORS

Allison **TORQMATIC DRIVES**

Compact, efficient hydraulic drives for Cranes • Trucks • Tractors • Scrapers • Shovels • Drilling and Servicing Rigs

your best bet... BSA single spindle automatic screw machines

for fast, economical single spindle bar work up to 2" diameter

The 2" BSA Single. Note open operating area for ample chip clearance and tooling accessibility.

- BSA Tools Ltd. of England, one of the world's oldest and largest machine tool builders, have produced and distributed thousands of these BSA "Singles" since they introduced them in 1926.
- Available in five standard capacities: ½", ¾", 1", 1⅛", and 2".
- All models use STANDARD AMERICAN TOOLING.
- Wide range of spindle speeds —200 to 6000 on ½" machine, 69 to 1260 on 2" model.
- Cams, change gears and tooling easily accessible for quick job-to-job changeover.
- Unit construction provides quick access for easy maintenance.
- Special spindle mounting, designed to reduce wear.
- Cross slides and turret mounted on replaceable ways.
- Positive chain drive from gear box to spindle prevents slippage.

distributed and serviced in U.S.A. by NATIONAL ACME

Since their introduction in this country, BSA Single Spindle Automatic Screw Machines have enjoyed remarkable acceptance. Combining latest automatic screw machine principles with proven design, they have produced at top standards of speed and accuracy with minimum upkeep.

BSA "Singles" are distributed and serviced in the United States by National Acme, in Cleveland, where adequate replacement parts are stocked —and you get the same active, experienced and interested service support as that on which National Acme's reputation has been built.

For specifications on all sizes, write for Bulletin BSA-54

OUR JOB: to provide the *Right Machine* for YOUR JOB

Acme-Gridley 4, 6 and 8 Spindle Automatic Bar and Chucking Machines • Fully Automatic Turret Lathes (Bar and Chuck Type) • Hydraulic Thread Rolling Machines • Automatic Threading Tools • Saltshes • Solenoids • Contract Manufacturing.

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Rolled, split bushings, bimetal or plain, are real money savers. Bimetal bushings give bearing performance at bushing costs for many applications. Plain bushings save money in hundreds of uses from business machines to bicycles. Both types available in a wide variety of sizes, with oil holes, grooves, notches, windows, straight, lock or special seams. Quality control. Engineering service.

FEDERAL-MOGUL CORPORATION, 11037 Shoemaker, DETROIT 13, MICHIGAN

FEDERAL Mogul since 1899

FEDERAL-MOGUL

Also sleeve bearings in many designs and sizes; cast bronze bushings; washers, spacer tubes, precision bronze parts and bronze bars.

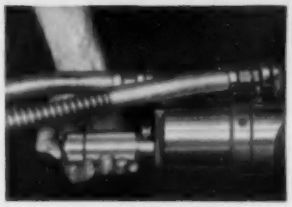
ACTION PICTURE
of how to save money by riveting!

This action photo, taken on the frame assembly line in one of the largest auto factories, illustrates how cost-conscious manufacturers save money with Hannifin "Hy-Power" Hydraulic Riveters.

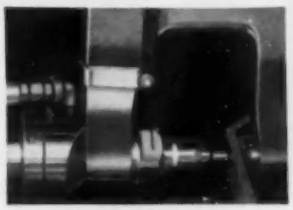
First step in assembly is to rivet the frame together...with Hannifin "Hy-Power" Riveters. The light-weight forged C-Frames hang from balancers within easy reach of each operator. No special skill is required to head the ⅜" rivets, cold, each in seconds. What's more, this "silent squeeze" method forms stronger, more uniform rivets, hot or cold.

Power source is the Hannifin "Hy-Power" Hydraulic Pressure Generator which quietly supplies pressure to the "Hy-Power" Cylinder that does the work. These riveters are available in 7½, 10, 12½, 17½, 25, 35, 50, 75 and 100-ton capacities.

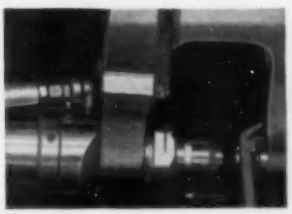
here's the HANNIFIN "HY-POWER" WORK CYCLE



In position. A single control button starts (or interrupts) the automatic Hy-Power cycle.



Ram approaches fast, then hydraulic pressure automatically intensifies, and the rivet head is formed.



Fast, automatic return. Total elapsed time to head a rivet is only 2 to 3 seconds.

"HY-POWER" CAN ALSO BE USED IN MULTIPLE TO SET SEVERAL RIVETS

Bulletin 150 tells how to save money on riveting, staking, punching, forming and bending operations. Write for copy.

do ALL you can do...with

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Air and Hydraulic Cylinders • Hydraulic Presses • Pneumatic Presses • "Hy-Power" Hydraulics • Air Control Valves

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Riss & Company, Inc. of Kansas City, Mo., specified that every one of their new fleet of 500 tractors be *equipped with a Fuller Semi-Automatic R-950-C* ROADRANGER *Transmission.*

With *single*-lever control of all 10 forward speeds, the Fuller ROADRANGERS permit Riss drivers to *anticipate grade requirements* and meet them with the right ratio at the right time. The ten closely spaced ROADRANGER gear ratios can be readily anticipated and rapidly engaged, without having to wrestle with gear splits or wait for automatic actuation. And with all forward ratios in even 28% steps, they can match power precisely to load and grade demands and at the same time save fuel by keeping the engine operating in the maximum horsepower range.

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For the most efficient, easiest-shifting transmissions available today . . . *specify Fuller Semi-Automatic* ROADRANGERS *for your fleet!*

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- Combines prime advantages of friction and mechanical sleeve clutches.
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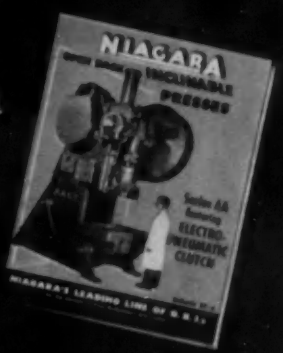
AND YOU'LL FIND ALL THE FACTS IN HERE!

BULLETIN 57-A
Sent free...promptly!



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America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

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Electronic Favorites in the GAGE LABORATORY

ELECTRONIC N-6 INTERNALCHEK: Choice of the world's finest laboratories; Amplifications, 1000/2000 Dual, 5000/10,000 Dual, 5000 Single; work part diameter, .240" to 12.000"; gaging depth, 1.5".

These Sheffield electronic instruments are ideal for:

1. *Highly accurate measuring on surface plates*
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The particular electronic circuit in these instruments is exceptionally stable. Protection from disturbing line voltage fluctuations eliminates drift, prolongs vacuum tube life and permits continuous use without the inconvenience of resetting.

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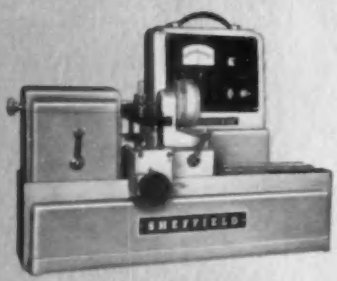
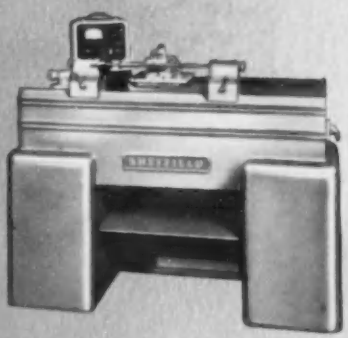


NEW HORIZONTAL EXTERNALCHEK: Dual amplification, 1000/2000 to one; capacity 12"; vertical table travel 2½"; micrometer tailstock with 1" adjustment.

ELECTRONIC HEIGHT GAGE: First choice of the toolroom; Amplification 1000/2000 Dual; scale range, .003"; smallest graduation, .0001"; overall vertical range, 26".

NEW ELECTRONIC COMPARATOR: Dual amplifications, 1000/2000 and 5000/10,000 to one; scale ranges .003", .0015", .0006" and .0003"; vertical capacity, 6"; anvil, 1⅛" x 5".



UNMATCHED ELECTRONIC LEADCHEK: Dual amplification, 1000/2000 to one; scale range, .0015"; super-precision micrometer; work capacity 36" for length and 10" for diameter.

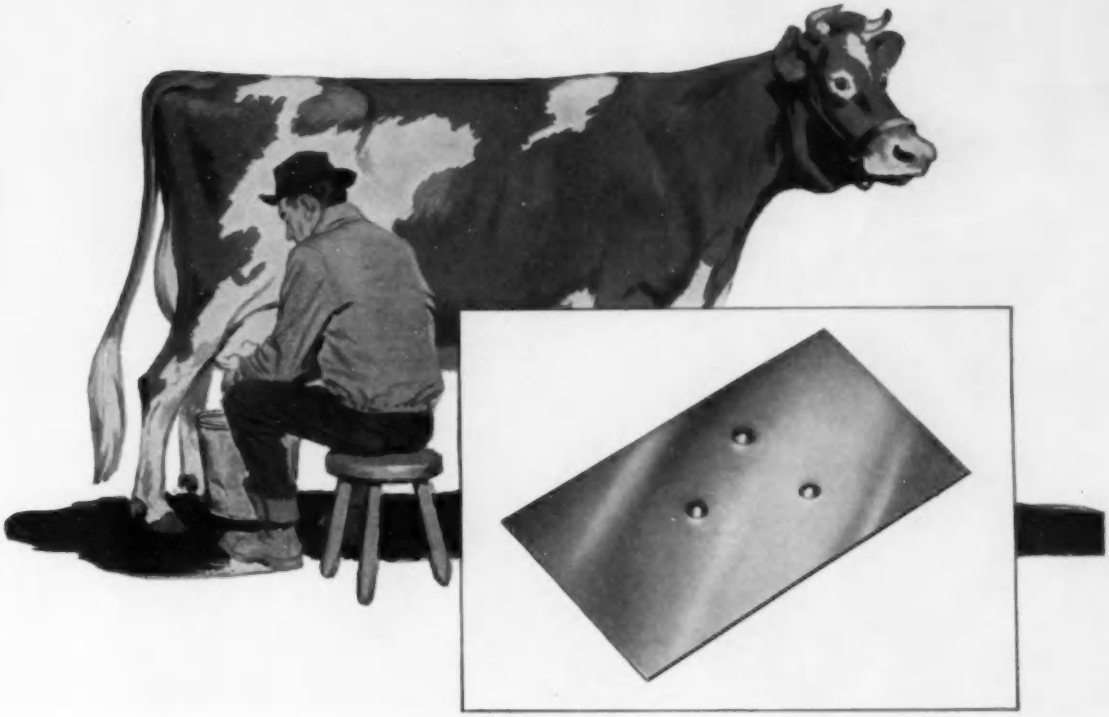
SHEFFIELD HEADQUARTERS — MASTER CRAFTSMAN

SHEFFIELD

THE MACHINE TOOL SHOW CHICAGO, ILL. SEPT. 6-17, 1955

BOOTH 1305

7147



The bumper mount and the 3-legged stool

A case history of interest to any manufacturer who uses flat-rolled steel.

A little piece of steel like that shown above serves as an automobile bumper mount. Originally, this mount was to be projection-welded to the bumper at each of four points. But during the welding process, at the supplying manufacturer's plant, one point of the mount either refused to take the weld, or it broke easily under strain.

Time was running out. Production lagged and costs skyrocketed. And then a Great Lakes Steel Technical Service Representative was called in. He discovered that, regardless of how flat the rectangular mounting might be, it was virtually impossible to get a strong projection weld at all four corners. But when he eliminated one weld, the plate snuggled into the bumper and made perfect contact on three points—just like a three-legged stool! Three welds were actually stronger than four.

Solving problems is a tradition at Great Lakes Steel. As specialists in flat-rolled products, Great Lakes has had to come up with the right answers to problems in many fields. It will pay you to take advantage of this reservoir of experience next time you have a problem that concerns flat-rolled steel.

GREAT LAKES STEEL CORPORATION
Ecorse, Detroit 29, Mich. • A Unit of
NATIONAL STEEL CORPORATION

PRODUCER of NAX HIGH-STRENGTH STEEL

SALES OFFICES IN BOSTON, CHICAGO, CINCINNATI, CLEVELAND, HOUSTON, INDIANAPOLIS, LANSING, LOS ANGELES, NEW YORK, PHILADELPHIA, PITTSBURGH, ROCHESTER, ST. LOUIS, SAN FRANCISCO AND TORONTO

The Fageol *Pony Express* is a "midget sized" delivery truck specially designed for city or suburban multi-stop delivery of bulky, low-density cargo. Made by the Twin Coach Company, of Kent, Ohio, the 2,785-pound *Pony Express* features simplified controls, excellent maneuverability, "sit or stand" right- or left-hand drive, fully automatic transmission, and special "hold-stop" service brakes.

"Pony Express" delivery trucks rely on Bundyweld for vital tubing parts

WHY BUNDYWELD IS BETTER TUBING

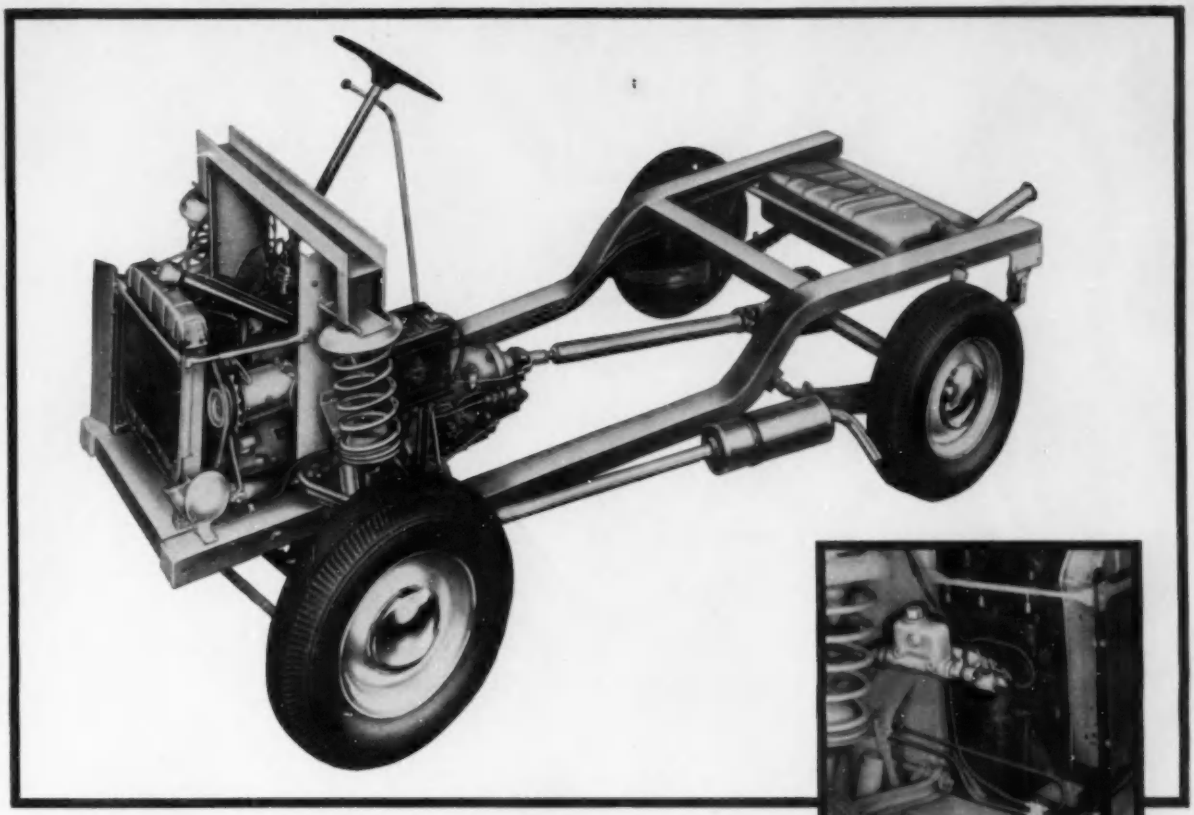
Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniformthickness, and

passed through a furnace. Copper coating fuses with steel. Result . . .

Bundyweld, double-walled and brazed through 360° of wall contact.

← **NOTE** the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead, and less chance for any leakage.



Leakproof, dependable Bundyweld Tubing is used in the brake-line and fuel-line systems of the *Pony Express*, as well as in the windshield vacuum line (not shown). Inset shows closeup of "hold-stop" service brakes. With the engine idling, the service brakes are held applied by a solenoid valve, even after the driver removes his foot from the brake pedal. Brakes are released when the accelerator pedal is depressed off idle position.

The Twin Coach Company's Fageol *Pony Express* has been specially designed to meet the need for a compact delivery truck which combines low-cost, dependable operation with maximum driver efficiency and comfort.

Naturally, the manufacturers of this sturdy, well-engineered, always-reliable delivery truck insist on a thoroughly dependable tubing for vital fuel, brake, and vacuum lines. *That's why their tubing choice centers on Bundyweld.*

Here's why you, too, can put your trust in this outstanding tubing: Bundyweld is leakproof by test; thinner walled yet stronger; can withstand heavy vibration fatigue, punishing wear; has high bursting strength. It's the only tubing double-walled from a single metal strip, copper-brazed throughout 360° of double-walled contact.

When you specify Bundyweld for your tubing needs, you not only get the industry's finest small-diameter tubing, but a host of valuable plus-services as well. You benefit from our technical assistance and engineering know-how; from our unexcelled facilities; and from our eager willingness to help you solve your tubing problem. Call, write or wire us.

BUNDY TUBING COMPANY
DETROIT 14, MICHIGAN

BUNDYWELD TUBING®

DOUBLE-WALLED FROM A SINGLE STRIP

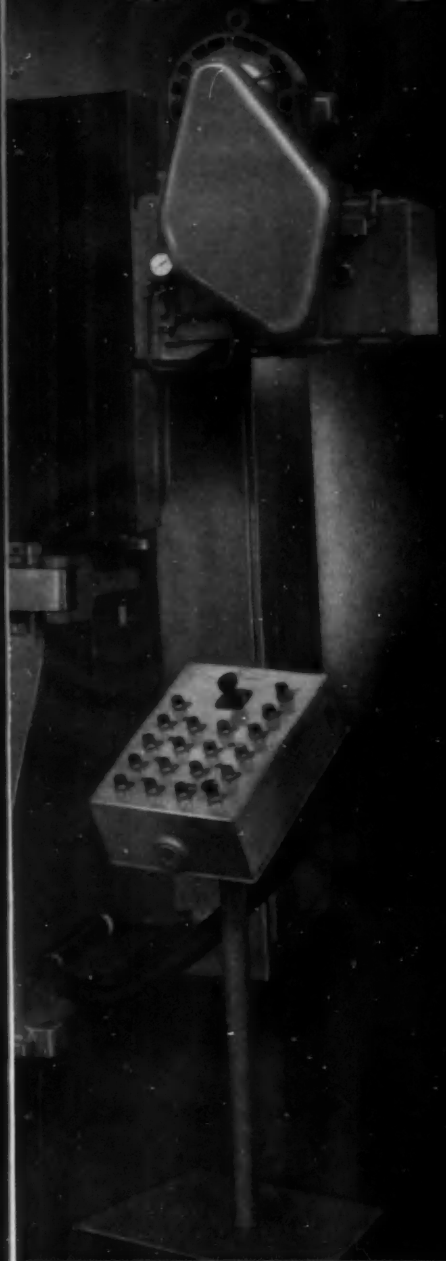
Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • **Chattanooga 2, Tenn.:** Pairson-Deakins Co., 823-824 Chattanooga Bank Bldg. • **Chicago 32, Ill.:** Lapham-Hickey Co., 3333 W. 47th Place • **Elizabeth, New Jersey:** A. B. Murray Co., Inc., Post Office Box 476 • **Los Angeles 58, Calif.:** Tubesales, 5400 Alcoa Ave. • **Philadelphia 3, Penn.:** Ruton & Co., 1717 Sansom St. • **San Francisco 10, Calif.:** Pacific Metals Co., Ltd., 3100 19th St. • **Seattle 4, Wash.:** Eagle Metals Co., 4755 First Ave., South **Toronto 5, Ontario, Canada:** Alloy Metal Sales, Ltd., 181 Pearl St., E. • **Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.**

Newton Vertical
Rotary Milling Machine

CONSOLIDATED MACHINE TOOL

A Division of Farrel-

TWO IN ONE



Here is a Newton Vertical Rotary set up for milling diesel engine oil pans. The head feeds along the cross-rail and mills the piece in one pass.

At the end of the cut, the spindles unclamp and retract. As the head returns to its starting point on the cross-rail, the table is automatically power indexed. The spindles lower and clamp and the next pan is milled.

This machine may run several weeks on oil pans. Then, by locking the head on the cross-rail and engaging the rotary table feed, it becomes a continuous rotary milling machine for an entirely different type of job! (Fixture change-over time—less than one hour.)

Two entirely different machines for not much more than the price of one. A good example of Consolidated's utility minded engineering.

COMPANY, ROCHESTER 10, N. Y.

Birmingham Company, Incorporated

Bendix Products Division

A good reliable source

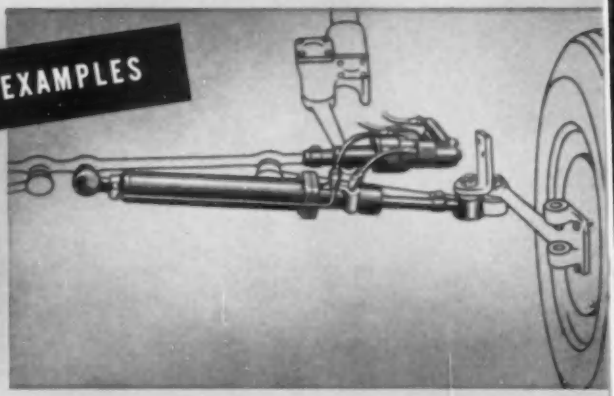
FOR AUTOMOTIVE COMPONENTS

Because of long experience, serving many customers,

Bendix Products Division can apply much of the combined know-how of the automotive industry

to any specific project in the design and manufacture of automotive components.

TYPICAL EXAMPLES



BENDIX LOW PEDAL POWER BRAKE—Specified by more car manufacturers than any other make, Bendix* Low Pedal Power Brake makes possible quick, sure stops by merely pivoting the foot from the go to the stop control. No need to lift the foot and exert leg power to bring the car to a stop. Result—more driving comfort, less fatigue and greater safety!

BENDIX LINKAGE TYPE POWER STEERING—Because Bendix* Power Steering is of the linkage type, manufacturers find it especially adaptable for production line installation without extensive engineering changes. Manufacturers can now meet the ever-increasing demand for power steering more efficiently and more economically with Bendix Linkage Type Power Steering.

*REG. U.S. PAT. OFF.

BRAKES • POWER STEERING • POWER BRAKING • CONSTANT VELOCITY UNIVERSAL JOINTS • HYDRAULIC REMOTE CONTROLS

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High Spots of This Issue

★ Ford Expanded Tractor Plant Has Miles of Conveyors

Materials handling economies are forcefully effected at Ford Tractor and Implement Div. with numerous monorail conveyor systems. The extensive network, along with automation devices and assembly operations, is described in this account. See Page 48.

★ American Methods Fitted to German Volkswagenwerk

One of Europe's largest car factories, the huge German Volkswagenwerk, turns out about 1000 vehicles daily. How American techniques have been modified to fit special conditions and the U. S. machines used are reviewed in the article. Page 54.

★ Balancing and Assembling Chevrolet V-8 Engines

Presented here is the second in a series of articles on the new Chevrolet V-8 engine plant at Flint, Mich. After previously covering segmented automation equipment for producing engine components, the author now studies engine assembly. Page 60.

★ New Setup at Chrysler for Machining of Pistons

Quite a few changes of interest have been instituted in the Chrysler Div. Detroit plant piston machining line for the Windsor V-8 engine. Included in the innovations are two special transfer machines to aid automatic operations. Page 68.

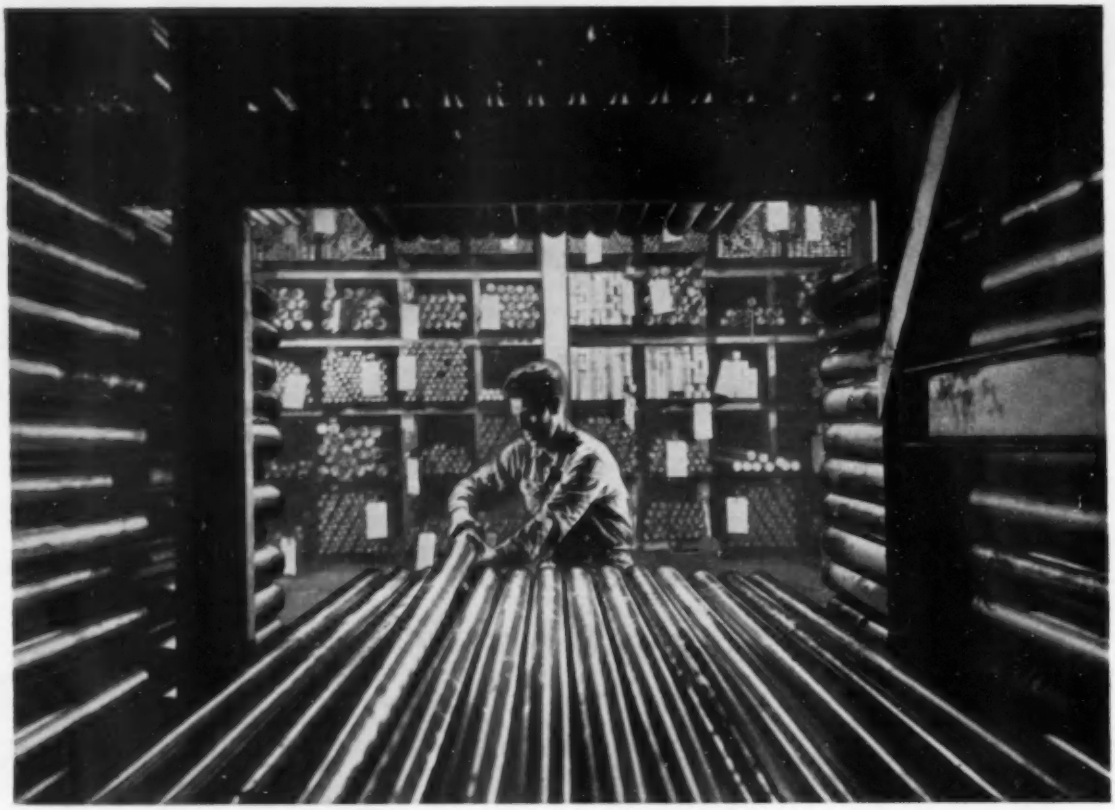
★ Dodge Trucks for 1955

The same "Forward Look" theme promoted in its passenger car program is also reflected in Chrysler Corp.'s commercial line for 1955. New Dodge trucks, as reviewed in this story, feature a wide variety of types and body styles. See Page 70.

★ 57 New Product Items And Other High Spots, Such As:

Geneva Motor Show; improved Communist models; SAE Production Meeting; die castings for car grilles; passenger car body widths; special equipment at Du Pont laboratory; titanium conference; machine tool ball bearing conference; and ASTE annual meeting and Western Exposition.

Automotive and Aviation News, Page 33
Complete Table of Contents, Page 3



Aimed right at your alloy needs

the world's largest alloy steel stocks

Thousands of tons of certified alloy steel in 1698 different sizes, shapes, analyses and conditions await your call at Ryerson. New leaded alloys are on hand in three different carbon ranges. Standard analysis steels are supplemented by a wide range of aircraft quality alloys. No matter what your alloy requirement, you can depend on Ryerson for quick delivery of highest quality steel.

You won't need to check or test your dependable Ryerson alloys before you use them because every bar has been spark tested and identified with its own heat symbol—every heat has been hardenability tested for you as part of an 8-step quality control plan. And should problems of application or fabrication arise, Ryerson alloy metallurgists will gladly put years of practical experience to work for you.

No order is too large to fill from stock, no order too small for quick personal service—so, next time you need alloy steel call your nearby Ryerson plant.

PRINCIPAL PRODUCTS

CARBON STEEL BARS — Hot rolled & cold finished.

ALLOYS—Hot rolled, cold finished, heat treated.

STAINLESS—Allegheny bars, plates, sheets, tubes, etc.

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STRUCTURALS — Channels, angles, beams, etc.

PLATES—Many types including Inland 4-Way Safety Plate.

SHEETS—Hot & cold rolled, many types & coatings.

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RYERSON STEEL

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News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 112, No. 8 April 15, 1955

Chrysler to Spend $10 Million For Expansion of Press Plant

Chrysler Corp. soon will begin construction on a 30,000 sq ft building which will ultimately expand metal stamping facilities at the Mack Ave. plant in Detroit. Estimated to cost in the neighborhood of $10 million, the expansion is part of a program started in July, 1954, to modernize fabricating assembly and painting facilities at the 2.24 million sq ft plant—the largest of 12 plants which Chrysler purchased from Briggs in 1953.

The new press plant will have a network of 1200 ft of steel conveyors to provide automatic removal of scrap metal at the rate of 2500 lb per minute. The scrap will fall from presses through chutes onto collector conveyors in the basement of the plant and then to a main conveyor, which will haul the metal to baling machines. It will then be transferred to chutes for dumping into railroad cars. The plant will also have three fully automated large press lines.

Fabricating assembly and painting facilities at the plant are scheduled for completion this September. The Mack plant builds approximately 90 per cent of the Plymouth bodies for the Detroit assembly plant, in addition to various body parts for the three other Chrysler Corp. divisions.

GMC Readies 'Dream Truck' For Limited Production

The first "dream truck" to be put into actual production will be GMC's L'Universelle ½-ton panel delivery, displayed for the first time at the 1955 Motorama in January (see AI, Jan. 15, page 58). Although present plans call for commercial production of the vehicle "as soon as possible," a number of engineering changes will be made first.

FAST TRACTOR

New British Diesel tractor, the Marshall M.P.6, is powered by a Leyland engine. The six - cylinder power plant of 351 cu in. displacement develops 70 bhp at 1700 rpm maximum governed speed. Transmission has six forward and two reverse gears. Weight of the tractor without water ballast is approximately 8400 lb.

Powered by a 180-hp, V-8 engine located behind and beneath the driver, the L'Universelle can be converted to serve a number of purposes. In addition to being useful as a panel delivery truck, the vehicle can be modified to serve as a taxicab, bus, and even as a station wagon. Its length, 188 in., permits installation of seats in the rear compartment to accommodate at least eight passengers.

Price and the number of units to be produced initially have not yet been set. GMC builds two other panel delivery trucks, a ½-ton and a ¾-ton.

Sales of Ford Thunderbird Hit 5925 in Five Months

Ford Div. claims that sales of the Thunderbird car from Oct. 22 to the end of the year exceeded total 1954 sales of its nearest competitor (the Chevrolet Corvette). A total of 5925 Thunderbirds was delivered in the first five months the car was on the market, the division has reported. Between Oct. 22, when the car was introduced, and Dec. 31, sales totaled 2784. The Dearborn, Mich., assembly plant, the only facility which now assembles the Thunderbird, is producing the car on an overtime basis at present, according to factory reports.

Cadillac Plans To Build $8000 Custom-Made Car

If Cadillac starts building the custom El Dorado Brougham this year, as is presently planned, it will be the first time a Motorama "dream car" will have been put into production the same year it was first displayed. While no definite price has been set for the car, it is expected to sell for about $8000, and annual output is expected to be held to about 1000 units.

Highest-priced car in Cadillac's series, the Brougham is a four-door sedan, powered by a 280-hp V-8 engine. It has an overall length of 209 in., height of 54 in. and is built of steel with an anodized aluminum roof panel extending from the windshield to the sash at rear. The car was first shown at the GM Motorama in New York in January (see AI, Jan. 15).

Business Manager Named For Each De Soto Region

Placing new emphasis on strengthening its field staff, DeSoto is appointing a business management manager for each of its 19 regions across the country. All appointees have had previous experience as district managers and in dealer business management.

News of the AUTOMOTIVE

JOSEPH S. HILDRETH

G. CARROLL BUZBY

Hildreth Elected Chilton Chairman, Buzby President

Joseph S. Hildreth has been elected chairman of the board of the Chilton Co., publishers of AUTOMOTIVE INDUSTRIES and other leading trade and business papers.

G. Carroll Buzby was made president of the Chilton concern at a regular meeting of the board of directors held recently.

Mr. Hildreth had been president of the company since 1945. Prior to that time, Mr. Hildreth was president of the Company's Automotive Div. He has spent 57 years in the publishing field.

Mr. Buzby, son of one of the founders of the Chilton Co., has been associated with the publication of AUTOMOTIVE INDUSTRIES, *Commercial Car Journal* and *Motor Age* for the past 35 years.

DELIVERY BOY ELECTRIFIED

Dubbed the "Pony Express," an electric platform truck with a series of mail sorting racks on the back is used to distribute correspondence at the Convair plant in Pomona, Calif. While the driver guides the truck between the 82 stops on the plant system, a mail clerk sorts those items picked up at each. Operation continues during bad weather with the aid of a removable plexiglas top and curtains.

Production Lines Rolling At Second New Ford Plant

Start of production this month at Ford Division's plant in Louisville, Ky., marks the second new plant which the division has opened in the past several weeks. Part of a program to replace older plants, the new 1.5 million sq ft assembly unit in Louisville will triple output capacity of the 30-year-old plant in that area, which is being shut.

Ford Division last month started output at a new 1.5 million sq ft assembly plant in San Jose, Calif., which replaced the old assembly facility in Richmond, Calif. A third new unit, a 1.9 million sq ft. assembly plant in Mahwah, N. J., also is expected to be placed into operation this year.

Studebaker Sees Big Increase In Its Second-Quarter Sales

Backed by the largest advertising campaign in its history, Studebaker estimates that its sales of cars and trucks will increase by 100 per cent in the April-June period over the same months last year. The company has doled out more than $3.5 million for newspaper advertising in 1955, and several other intensive promotional and merchandising campaigns are underway. Production of Studebaker cars and trucks from January 1 to the end of March was almost double that of the same period last year in totaling 45,200 vehicles.

White Forms New Division For Non-Automotive Items

Formation of a Special Products Div. to handle the development and manufacture of a diversified line of non-automotive products has been announced by White Motor Co. Kenneth F. Ode, manager of Government contracts for White, has been appointed general manager of the division.

White has been producing a number of non-automotive products for both civilian and defense customers. In defense production, the company has made tank gun fire control equipment and currently is doing development work on various military items.

AND AVIATION INDUSTRIES

Assets of DCPI Additive Are Explained by Du Pont

Air pollution reduction, savings in fuel oil, and the possibility of obtaining new jet fuels from materials now considered unsuitable are said to be among the advantages of a new chemical additive known as DCPI. Described in a paper presented by a Du Pont chemist at the recent national meeting of the American Chemical Society, it reportedly makes heating oil burn cleaner.

It is also claimed that less smoke, reduced carbon deposits, more efficient burning, and good anti-knock properties are the results of adding less than one-tenth of one per cent of DCPI to fuel oil or gasoline. The report indicated, however, that it would not be practical to use DCPI in gasoline unless a way could be found to overcome the adverse effects of iron oxide deposits within the engine cylinder.

GIANT SCRAPER FOR CONSTRUCTION PROJECTS

Now offered by LeTourneau-Westinghouse Co. to the construction industry is the B Tournapull 23-yard, self-propelled scraper. Powered by a 293-hp Cummins or GM Diesel engine, it has 10 gear ratios ranging from 2.4 to 28.4 mph. High apron lift permits free injection of any material that is being handled.

Car Output Optimism Prevails Despite Contract Uncertainty

Automobile plants continue to turn out cars at capacity levels as contract negotiations among the UAW-CIO, General Motors, and Ford enter the second week. Only a slight letup is expected in automobile production during April, and present schedules are geared to top 730,000 cars. If the aforementioned rate of production continues for another two months, it will easily give the industry two million vehicles for the second quarter and a total of well over four million units for the first half of the year. This optimistic forecast prevails despite uncertainties of present management-union negotiations.

A record output of more than 790,000 cars in March boosted the first quarter total to slightly over 2.1 million, the first time that more than two million automobiles have been built in any three-month period. All automobile producers, with the exception of Lincoln and Kaiser, turned out more automobiles in the first quarter of 1955 than they did in the same quarter of 1954.

GM reported that it built 1,044,398 cars during the first quarter, a 48 per cent increase over the 706,319 units the corporation turned out in the same quarter last year. Output at Chrysler Corp. soared to 412,533 cars for the first three months, against 182,641 in the corresponding 1954 period. Ford Motor Co.'s production of passenger cars—including Ford, Mercury, and Lincoln—aggregated 556,712 units in the first three months, against 468,229 in 1954.

Car sales also continue unabated, and new records may be set before the April-June quarter closes. The second quarter traditionally is considered the best selling period of the year. Preliminary sales figures for March apparently topped previous monthly records, and some industry sources estimated these as high as 700,000 units.

MIDGET FIRE TRUCK FOR CONFINED SPACES

This miniature fire truck, being tested at the Indianapolis plant of the GM Allison Div., is only 150 in. long and 48 in. wide. Able to travel inside plant aisles, it hauls 300 gal of water and two 150-ft reels of hose. The truck has a 98-in wheelbase and is powered by a 90-hp engine with power takeoff to drive the three-piston pump.

News of the AUTOMOTIVE

FORD FARMER

Full three-plow power is built into the new "900" series tricycle tractors announced by the Tractor and Implement Div. of Ford Motor Co. Shown here is the "960" model, equipped with five-speed transmission and live power take-off. Also offered is the "950" with five-speed transmission and the "740" two-plow model with four-speed transmission.

L-M Starts Second Shift At Another of Its Plants

High sales demand has necessitated the addition of a second work shift at the Mercury plant in Metuchen, N. J., which supplies cars to 300 of the division's dealers in the eastern sales region. Mercury sales have been climbing steadily since the beginning of the year, and in March alone were about 25 per cent higher than in the same month of 1954.

Addition of the second shift will increase total employment at the Metuchen plant to more than 3000 persons. Several weeks ago a second shift was put into operation at L-M's plant in St. Louis, and output there has been almost doubled to nearly 640 cars a day.

AC Spark Plug Set to Produce Jet Engine Fuel Control Units

AC Spark Plug Div. of General Motors Corp. has entered a new field—the design, development, and production of jet engine fuel control systems. Present work will concern controls for afterburners on several types of aircraft engines.

The new project will be concentrated in a recently leased building in Milwaukee, Wis., and production is scheduled to begin this month.

The fuel control work being done in Milwaukee formerly was centered in GM's Rochester Products Div. The projects reportedly were moved to Milwaukee because of AC's closer association with aviation and instrument fields.

Employes' Ideas Help Industry Save Money

About one fourth of the suggestions submitted to management by employes are of value. Many of those which are adopted oftentimes result in big savings to the company.

Of the total 192,000 ideas dropped in suggestion boxes at General Motors Corp. last year, 46,995 were found practicable by the corporation. Awards paid out for these suggestions totaled $2,467,513, a new record. Since the suggestion plan was set up at GM in 1942, 1.3 million ideas have been submitted by employes, and 310,511 have been adopted.

Station Wagons Representing 23 Per Cent of AMC Output

The increasing popularity of station wagons, which reached a record production of more than 364,000 units last year, is indicated again in a report from American Motors Corp. At present, the Rambler station wagon is accounting for more than 23 per cent of total AMC production.

Three Truck Line Prices Up An Average of Six Per Cent

Ford, Chevrolet, and GMC 1955 truck prices have been increased an average of about six per cent on "volume" lines. Due to the great number of changes in many specialized types, including Diesels, prices in some instances have been boosted much higher.

Prices announced by Chevrolet, Ford, and GMC on their volume lines indicate average increases ranging from $10 to $148. Although Ford boosted suggested factory retail prices on its light and medium trucks from $10 to $142.50, prices remain the same on several other units, such as the F-700 heavy duty, the B-700 school bus, extra heavy-duty, and the tandem axle series.

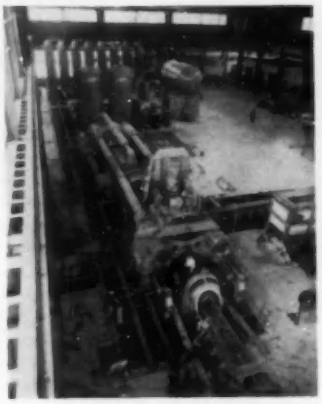
Price increases on Chevrolet trucks range on the average from $111 on the two-ton model to $148 on the ½-ton panel unit. GMC, on the other hand, estimates its price increases average about four to five per cent on the light duty trucks and two per cent on the heavy-duty jobs. For example, GMC's price on the No. 101 ½-ton model was boosted $69, while the 631-42A five-ton model now carries a price tag of $6419, up $44.50 from last year.

SAE Aeronautic Meeting To Include Seven Panels

Seven panel discussions are scheduled for the Third Annual SAE Aeronautic Production Forum in New York City on April 21. The meeting is being held in conjunction with the SAE Aeronautic Meeting on April 18, 19, and 20.

Automation will come in for its share of attention under a panel topic called "Automation and Its Effect On Manufacturing Methods." Other panels include: "Techniques For Improving Factory Communications"; "Engineering Changes in a Competitive Market"; "Taking the Dollars Out of Quality Control Without Losing Quality"; "The Effect of a Cost Reduction Program on Tooling"; "Getting Maximum Results from A Cost Reduction Program"; and "Problems in the Manufacture of Electronics Equipment."

AND AVIATION INDUSTRIES



GIANT-SIZE PRESS

Curtiss-Wright Corp. is now producing aircraft components on this huge Loewy steel extrusion press at its Metal Processing Div. plant, Buffalo, N. Y. Said to be the largest in the world of its type, the 12,000-ton capacity unit will be used to extrude steel, titanium, and non-ferrous alloy components. The 240-ft-long press was installed jointly by the USAF Air Materiel Command and Curtiss-Wright.

Evans Ad Correction

In the advertisement of the Evans Products Co. in the March 15, 1955 issue of AUTOMOTIVE INDUSTRIES, page 535, there were two typographical errors and the statement involved should have read as follows:

"Each Evans heater has a part repair or replace warranty for one year or 50,000 miles, whichever occurs first."

Oldsmobile Produces Two Millionth V-8

The high rate of production of V-8 engines by the automobile industry to meet demands for the powerplant is pointed up again in a report from Oldsmobile. On March 29, the GM division turned out its two millionth "Rocket" V-8 engine, exactly one year after it produced the 1.5 millionth unit.

The first Oldsmobile V-8 engine came off the assembly lines in Lansing, Mich., on Nov. 3, 1948. Another GM division, Buick, recently turned out its one millionth V-8 engine. That division, however, did not bring out its V-8 until 1953.

AI TABLOID

Caterpillar Tractor Co. has introduced the new 125-hp, four-cylinder D339 Diesel engine in its industrial line. It replaces the discontinued D8800 model.

* * *

Brooks Equipment and Manufacturing Co. has been acquired by Ingersoll Kalamazoo (Mich.) Div. of Borg-Warner Corp. . . . Panellit, Inc., has taken over Jordan Electronic Mfg. Co., Inc.

* * *

General Electric Co. is offering advance prototypes of exhaust gas thermocouples free of charge to jet engine manufacturers.

* * *

Scintilla Div. of Bendix Aviation Corp. is erecting a new $2 million building at its Sidney, N. Y., plant to consolidate various departments.

* * *

Jervis B. Webb Co. of California has moved into new offices in its factory building at 9301 Rayo Ave., South Gate, Calif. . . . The Los Angeles District office of Norton Co. has moved to 5905 Pacific Blvd., Huntington Park, Calif.

* * *

Univ. of Maryland last month dedicated its new $8.5 million Glenn L. Martin Institute.

* * *

Goodyear Tire & Rubber Co. plans to build a new plant near Valencia, Venezuela . . . Owens-Illinois Glass Co. will erect a new plant close to Havana, Cuba.

* * *

Pratt & Whitney Aircraft is presenting the first J-57 engine to be built to the Smithsonian Institution.

* * *

Dedication ceremonies for the new $1 million plant of R. M. Hollingshead Corp. at Sunnyvale, Calif., are scheduled for May 12.

Chain Belt Co. has purchased 47 acres near Downers Grove, Ill., to expand its Shafer Bearing Div. . . . Minneapolis-Honeywell Regulator Co. will erect a new $1.75 million factory in Chicago, Ill.

* * *

Baldwin-Lima-Hamilton Corp. has signed an AEC contract for a study of a new nuclear power, reciprocating locomotive engine . . . Rolls-Royce will produce new horizontal type Diesel engine for railroad use.

* * *

All American Engineering Co. is using a new jet-powered test car in the development of arresting gear for high-speed aircraft. It is powered by two Allison J33-A8 engines.

* * *

New Home Coach Co. is now producing house trailers with a one-piece reinforced plastic roof.

* * *

Borg-Warner Corp. reportedly will acquire or build more plants on the West Coast . . . Allis-Chalmers Mfg. Co. has also expressed an interest in West Coast expansion.

* * *

Hartford Special Machinery Co. has purchased the complete line of Rockwell Hydraulic Drill Units from Rockwell Mfg. Co.

* * *

Parker-Kalon Div. of General American Transportation Corp. is building a new manufacturing plant at Clifton, N. J. . . . Hyde Spring and Wire Co. will erect a new factory at Brantford, Ont.

* * *

Kysor Heater Co. will offer to the trucking industry this summer a new self-powered, roof-mounted air conditioning unit.

(*Turn to page* 160, *please*)

News of the AUTOMOTIVE

The PMCO 7ST, said to be the largest three-phase spot welder in the world, was built especially for Sciaky Research Div. for the development of aircraft structural fabrication. Capable of delivering 300,000 amp of welding current and 38,000 lb pressure, it will weld 1/4 in. to 1/4 in. aluminum to rigid specifications. Capabilities on other materials include 1/2 in. and 1/2 in. mild steel, 1 in. to 1 in. pickled mild steel, 7/8 in. to 7/8 in. scaly mild steel, and .375 to .375 stainless steel welded to specifications.

MARCH CAR OUTPUT GREATEST OF ANY MONTH EVER

1955 Passenger Car Production

As reported direct to Automotive Industries by the car factories

	March 1955	February 1955	March 1954	Three Months 1955	Three Months 1954
Hudson	10,345	6,059	2,965	19,379	6,365
Nash	15,938	9,698	5,604	30,119	20,494
Total—American Motors	26,284	15,757	8,569	49,498	26,859
Chrysler	23,520	17,063	9,911	58,053	31,152
De Soto	15,813	14,007	6,054	43,289	20,822
Dodge	35,208	31,392	11,308	99,397	31,094
Plymouth	79,680	68,068	39,039	211,794	99,573
Total—Chrysler Motors	154,221	130,530	66,312	412,533	182,641
Ford	157,672	137,175	134,948	439,808	388,629
Lincoln	4,479	3,708	4,597	11,084	12,937
Mercury	39,756	34,870	29,069	107,010	65,672
Total—Ford Motors	201,907	175,754	168,614	558,712	468,229
Buick	79,034	64,117	50,890	205,579	131,775
Cadillac	15,384	13,407	12,238	43,016	25,767
Chevrolet	173,031	153,483	131,151	461,042	358,709
Oldsmobile	56,583	50,257	38,960	157,266	90,908
Pontiac	59,094	49,602	35,526	157,496	99,100
Total—General Motors	385,936	330,906	268,765	1,044,398	706,319
Packard	6,441	6,230	3,916	19,084	11,613
Studebaker	18,147	14,912	7,080	42,855	25,159
Total—S-P Corp.	24,588	21,142	10,970	62,519	36,772
Kaiser			929		1,887
Willys	1,644	1,570	1,725	4,340	3,207
Total—Willys Motors	1,644	1,570	2,654	4,340	5,094
Total—All Makes	794,880	675,719	525,930	2,130,106	1,425,914

Resistance Welding Center Is Set Up by Sciaky Bros.

Sciaky Bros., Inc., held "open house" at their Western Research Div., 2311 Purdue Avenue, West Los Angeles, Calif., on March 30. Said to be the largest manufacturer of electric resistance welders in the world, Sciaky has plants in Chicago, London and Paris.

The Research Div. specializes entirely in resistance welding and its related problems. Provision has been made for special laboratories, testing machines, metal preparation, machine shop, and a complete line of welding machines in the modern 15,000 sq ft building.

Location of the research center on the West Coast was considered necessary in view of the great amount of research and development being undertaken by the aircraft and electronic industries in that area. Its facilities are readily available to all who may have need of them.

Broad Program of Activity

A broad and thorough program has been laid out by the Research Div. In general, two plans are being followed: First, specific problems or investigations desired by users or potential users of the resistance welding process; and, second, basic research into the resistance welding process as concerns its behavior with various metals; variations in conditions; and the development of adequate instrumentation, monitoring and inspection.

Other phases of the research program involve the development of technical information, such as application, joint patterns, structural qualities, and the economics of resistance welding design. These data will be made available to industry through such media as a specialized technical library, periodicals, special bulletins, conferences, and special research programs.

Boeing 1954 Sales Exceed $1 Billion

Boeing Airplane Co. has reported 1954 sales of $1,033 billion. Net earnings after taxes were $36.9 million, against $20.3 million in 1953.

AND AVIATION INDUSTRIES

Ford to Build New Facility For Testing Farm Equipment

A new outdoor Evaluation Center for tractors and farm equipment, which reportedly will combine the best features of automobile test tracks and present farm equipment laboratories, will be built by Tractor and Implement Div. of Ford Motor Co. The facility will be located on a four-acre plot at the division general offices, Birmingham, Mich.

The compact center will have four "torture" courses inside a one-third mile oval test track. Engineers will use them to put experimental and production tractors and farm equipment through intensive tests simulating field conditions.

The four torture courses will include an obstacle course and hydraulic testing area, a "rumble" course, and two "pitch and twist" courses. The facility is so designed that a truck equipped with electronic recording devices will be able to follow tractors and farm equipment through the torture courses to evaluate performance.

White Motor May Acquire Pittsburgh Engine Firm

If White Motor Co. acquires the Engine Div. of National Supply Co. of Pittsburgh, Pa., as planned, the truck company would have an additional 120 sales distribution outlets for its Diesel engines. These outlets are located principally in oil-producing areas throughout the world, and National Supply would act as distributor for White in those locations, if proposed arrangements between the two companies work out.

Two-Month Chrysler Profits Exceed Total 1954 Earnings

Chrysler's resurgence in the automobile sales market is pointed up in the first financial report released for 1955. During the first two months, Chrysler earnings surpassed the total for the entire year of 1954. The corporation did not reveal the figures for the two-month period, but earnings in 1954 totaled $18.516 million.

Chrysler estimates that its sales for the first quarter approximated $935 million. This would amount to more than 45 per cent of sales for all of 1954, which totaled $2.071 billion.

The company's dealers have sent in more than 970,000 orders since the 1955 cars were introduced last fall.

Since Chrysler Corp. plants had turned out 700,000 cars up to March 30, a backlog of 270,000 units is still indicated. Production is running at about a 34,000-a-week rate, compared to 15,000 last year.

At present, Chrysler Corp. is producing about 19 per cent of all the cars, only one per cent under its minimum goal of 20 per cent for 1955. Retail sales are now accounting for about 18 per cent of the total car market.

Douglas Records 1954 As Outstanding Year

Douglas Aircraft Co., Santa Monica, Calif., reported 1954 was its most profitable year, with earnings rising to $36,156,000, or $14.70 a share, from $18,586,000, or $7.73 a share in 1953. Sales totaled $915,216,000 against $874,515,000 in 1953. While military sales amounted to $756 million, commercial sales of $159 million were the highest in the company's history, it was reported.

Continued on Page 102

BEST CAR, TRUCK, BUS TOTAL IN HISTORY SET IN FEBRUARY

1955 U. S. Motor Vehicle Factory Sales*

	Passenger Cars	Trucks	Buses	Totals 1955	Totals 1954
January	636,242	89,676	190	726,108	551,134
February	678,254	67,061	176	745,491	534,145
Total—Two Months	1,314,496	156,737	366	1,471,599	1,085,279

1955 U. S. Motor Truck Factory Sales by G.V.W.*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
January	42,396	15,055	4,058	16,510	4,741	3,279	3,636	89,676
February	30,036	11,277	2,646	11,949	3,875	3,350	3,899	67,061
Total—2 Mos. 1955	72,432	26,322	6,704	28,459	8,616	6,629	7,535	156,737
Total—2 Mos. 1954	84,933	33,702	6,815	33,391	7,573	10,215	6,079	183,308

* Automotive Manufacturers Association.

1955 RETAIL CAR SALES BY PRICE GROUPS*

Number of Sales

	January 1955		January 1954	
Price Group	Units†	% of Total	Units†	% of Total
Under $2,000	220,677	50.46	203,727	60.04
$2,001 to $2,500	142,822	32.61	90,364	26.63
$2,501 to $3,500	60,058	13.27	33,353	9.83
Over $3,500	16,013	3.66	11,864	3.50
Total	437,370	100.00	339,308	100.00

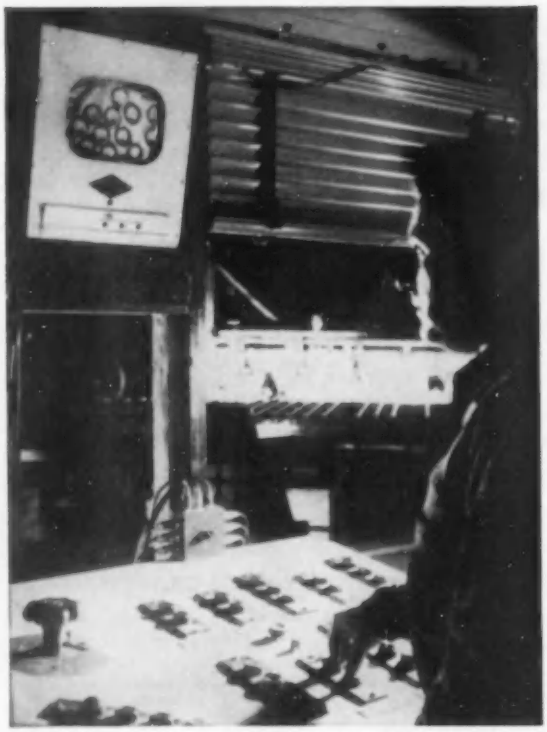
Dollar Volume of Sales*

	January 1955		January 1954	
Price Group	Dollars	% of Total	Dollars	% of Total
Under $2,000	$419,736,490	42.68	$371,124,728	52.21
$2,001 to $2,500	332,525,790	33.82	205,268,500	28.88
$2,501 to $3,500	165,470,300	16.83	91,107,163	12.82
Over $3,500	65,377,060	6.67	43,296,409	6.09
Total	$963,309,660	100.00	$710,815,800	100.00

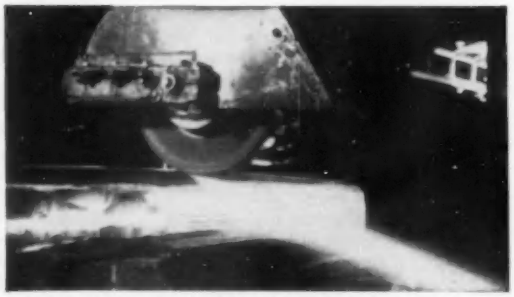
*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four-door sedan or equivalent model. Does not include transportation charges or extra equipment.
†—New registrations of American made cars only. Does not include imported foreign cars.

THE NUMBER 25877 on the bearing cone at right—coupled with 25821 on the cup—tells you it's a tapered roller bearing of a certain size used on rear wheels. It doesn't tell you anything about the quality of the bearing or the services that go with it. But the trademark "Timken®" stamped on the bearing does.

What a bearing number doesn't tell you



WE WATCH OUR BEARING STEEL WITH TELEVISION EYES to prevent it from jamming-up in the furnace during the important slow-cooling process. We use ultra-modern machines and methods like this—in research and production—to make Timken bearings the No. 1 value for your car's moving parts, the vital zone.



WE'RE SO FUSSY ABOUT THE QUALITY of the steel that goes into a Timken bearing, that we make our own. The grinding operation shown above removes surface defects. It's only one of the many quality steps that make Timken steel the finest bearing steel ever made.

WE PUT OUR ENGINEERS TO WORK FOR YOU. One example: in this rear axle oscillating test we run bearings under abnormal load conditions. Result: valuable data that helps car makers get better performance from their Timken bearings. It's another reason for specifying "Timken" with the bearing number. For *full* value always use a Timken bearing cup with a Timken bearing cone. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN *is number* 1 *for* **VALUE** *where value counts most...in the vital zone*

TRADE-MARK REG. U. S. PAT. OFF.

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂ THE TIMKEN TAPERED ROLLER ⊂ BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

Men in the News

Packard Div., Studebaker-Packard Corp. —Dan O'Madigan, Jr., has been appointed general sales manager.

Purolator Products, Inc.—**James D. Abeles** has been elected president and chief executive officer, succeeding **Ralph R. Layte**, now vice-chairman of the board of directors. **H. Joseph Markert** was named executive vice-president.

Chrysler Corp.—**Paul W. Auble** has been appointed staff management development coordinator; **Norman H. Deunk**, staff assistant to the vice-president and director of industrial relations; **James S. Ross**, executive assistant to the vice-president and general manager of trucks, Dodge Div.; **Fred Osann, Jr.**, director of forward planning for the Automotive Body Div.; **Ledyard Mitchell, Jr.**, director of forward planning for Chrysler Div.; **William M. Williams**, manager of the Detroit Tank Plant; and **Hayward F. York**, operating manager of the Jet Engine Plant.

Warner & Swazey Co.—**Charles J. Stillwell** has been elected chairman of the board, and **Walter K. Bailey** has been elected president.

AC Spark Plug Div., General Motors Corp.—**Joseph K. Decker** has been appointed director of purchases.

Minnesota Mining & Mfg. Co.—**Louis F. Weyand** has been named sales director.

Cummins Engine Co., Inc.—**Paul J. Every** has been named assistant general sales manager.

Micromatic Hone Corp.—**Don S. Connor** has been named general manager; **William H. Harris, Jr.**, vice-president and assistant general manager; and **R. G. Ellis**, chief engineer.

Rochester Products Div., General Motors Corp.—**Richard T. Mansfield** was named comptroller.

Solar Aircraft Co.—**Cyril D. Oberg** was named manager of aircraft and engine component sales, and **William F. Cords** was made his assistant.

Chrysler Div., Chrysler Corp.—Clare E. Briggs has been appointed assistant to the president in charge of sales, and Burton R. Durkee has been named director of advertising and merchandising.

Hall-Scott Motors Co.—**A. G. Baxter** has been appointed sales manager.

Russell, Burdsall & Ward Bolt & Nut Co.—**John S. Davey** has been promoted to vice-president.

Convair Div., General Dynamics Corp.—**Dr. Frederic de Hoffmann** has been appointed assistant vice-president for nuclear planning.

National Broach & Machine Co. — D. Pierson Smith was elected vice-president in charge of sales.

Plymouth Engine Div., Chrysler Corp.—**Hector M. De Brabant** has been appointed manager.

Studebaker-Packard Corp.—**Charles R. Herrick** has been promoted to general traffic manager.

Consolidated Engineering Corp.—**Francis T. Greenup** has been appointed chief design engineer.

National Vulcanized Fibre Co.—Henry C. Guhl has been named manager of engineering, while Gerard A. Albert has been made manager of manufacturing.

AC Spark Plug Div., General Motors Corp. —Henry P. Stanley has been advanced to director of aviation sales.

Bell Aircraft Corp.—**O. A. Pfaff**, president and general manager of American Wheelabrator & Equipment Corp., was elected to the board of directors.

Aro Equipment Corp., Air Tool Div. —**Gene R. Voigt** has been chosen assistant to the general manager.

John Hassall, Inc.—**Perry E. Hall** and **Harry H. Rains** have been elected to the board of directors.

Electric Products Co.—**G. J. Doss** is now manager of marketing.

Necrology

Walter N. Potter, 60, general manager of United Motors Service Div., General Motors Corp., died March 25, at San Francisco, Calif.

Clarence B. Hayes, 88, founder of the former Hayes Wheel Co. and chairman of the board of Hayes Industries, Inc., died April 1, at Jackson, Mich.

John T. Gallatin, 51, vice-president of Detroit Harvester Co., died March 31, on an airplane to Cleveland, O.

Fred F. Harroff, 58, former general manager of the Lamp Div., General Electric Co., died March 27, at Asheville, N. C.

Harry B. Lilley, 54, district manager of the Steel and Tube Div., Timken Roller Bearing Co., died March 24, at Detroit, Mich.

Carl Becker, 53, executive assistant to the vice-president of Electric Auto-Lite Co., died March 16, at Toledo, O.

James D. M. Ray, 61, aeronautical engineer, died March 24, at Toronto, Ont.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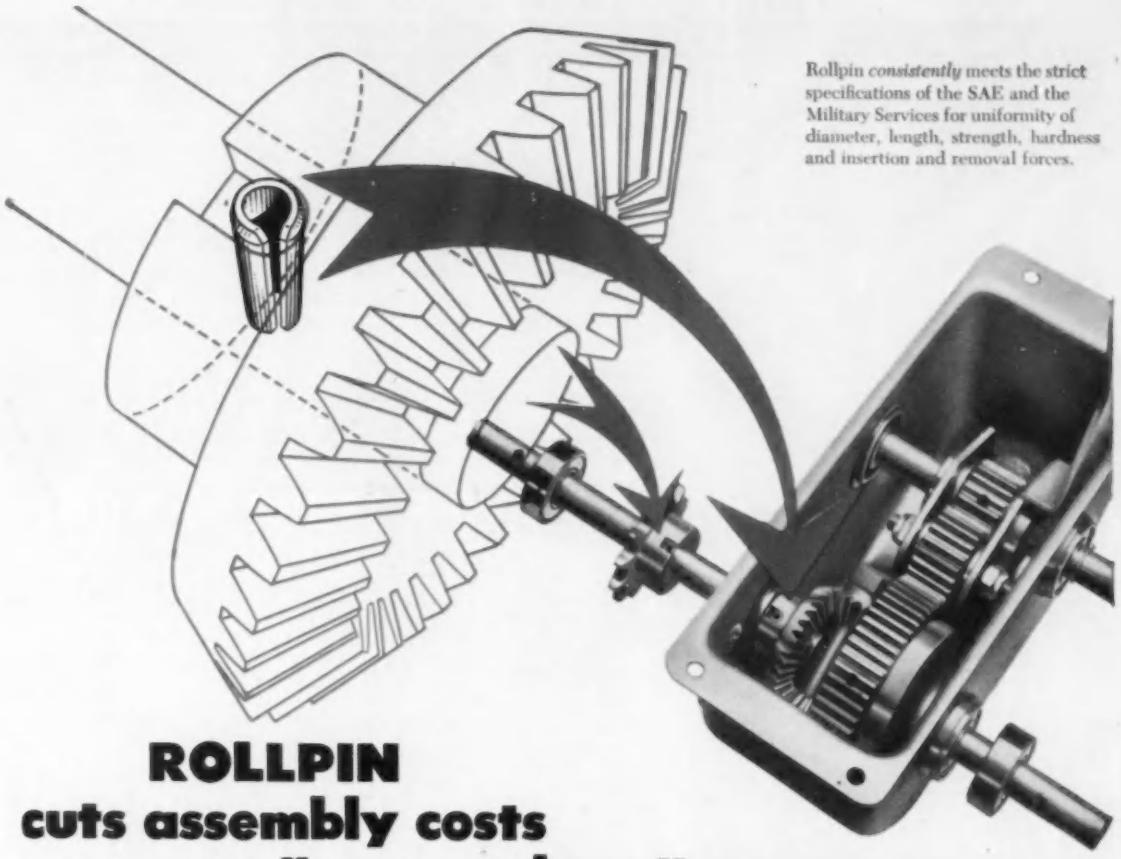

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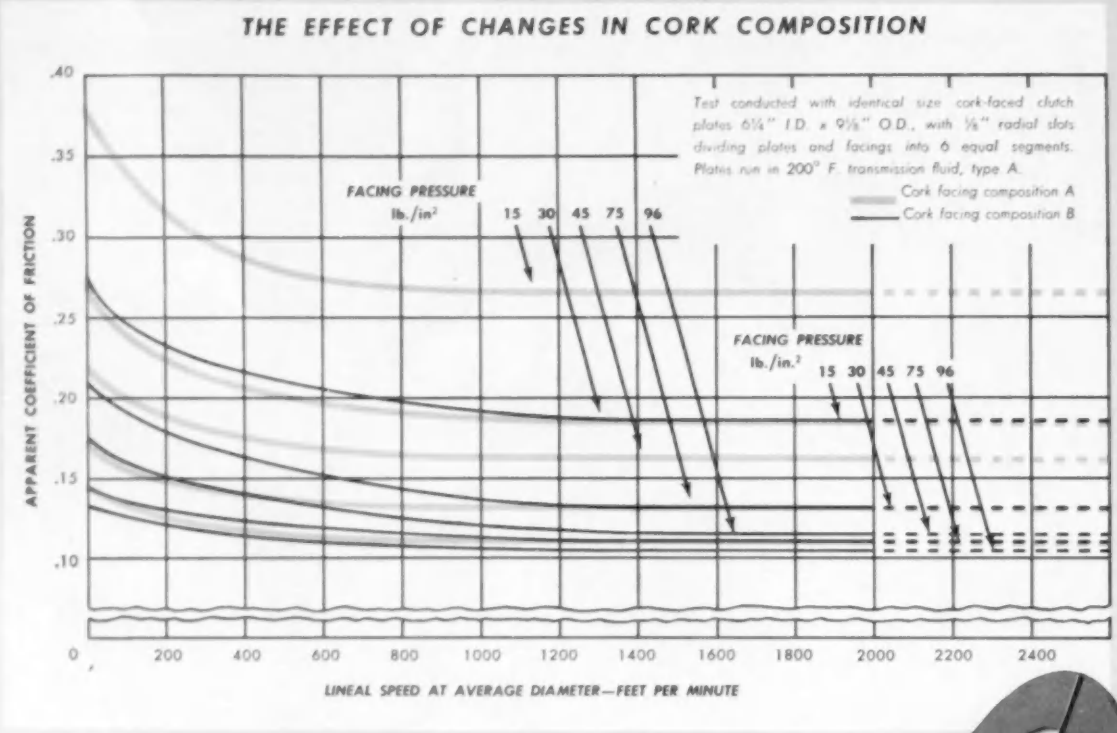

CORK CLUTCH FACINGS:

How torque capacity can be modified by changes in cork composition

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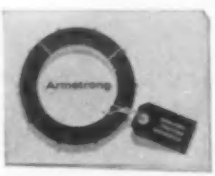
Cork clutch facings can be compounded with a variety of resins, fibers, and rubbers. As a result, there is a wide range of cork compounds available, each offering somewhat different torque capacity. Within this range, designers can usually find a facing material that will deliver the exact performance required.

The chart above illustrates how changes in clutch capacity can be produced by modification of the cork compound used as facing. The values shown were developed by clutch plates identical in all respects except for the facing compound. The frictional patterns of both are similar, because the metal plates were of the same design and size. But the apparent coefficients of friction produced by composition A are higher than those produced by composition B.

This wide range of torque capacities is only one of many unique advantages which cork-compound friction materials offer. For more information on the performance versatility of these materials, send for a copy of our new booklet, "Armstrong Resilient Friction Materials." Write on your letterhead to Armstrong Cork Co., Industrial Div., 7204 Imperial Ave., Lancaster, Pennsylvania.



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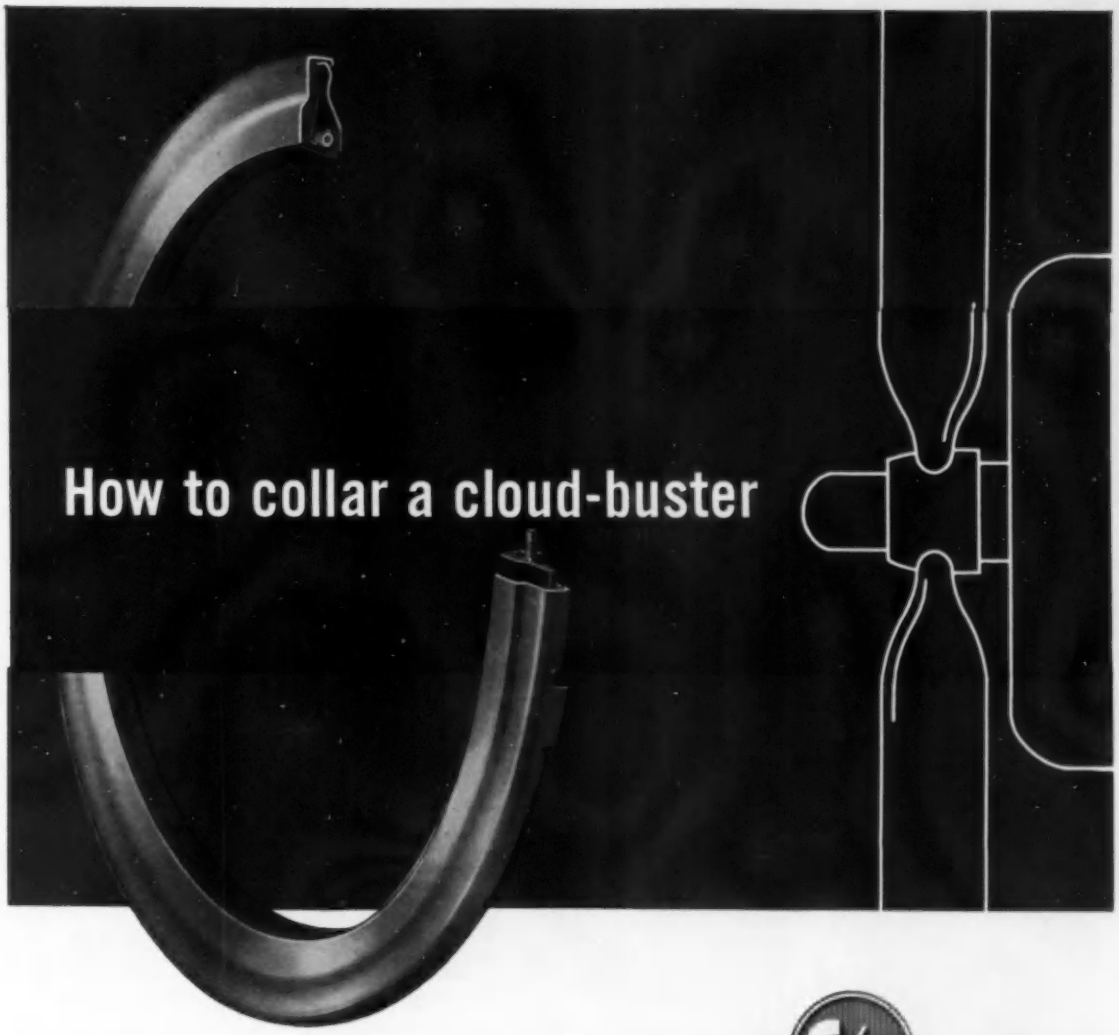

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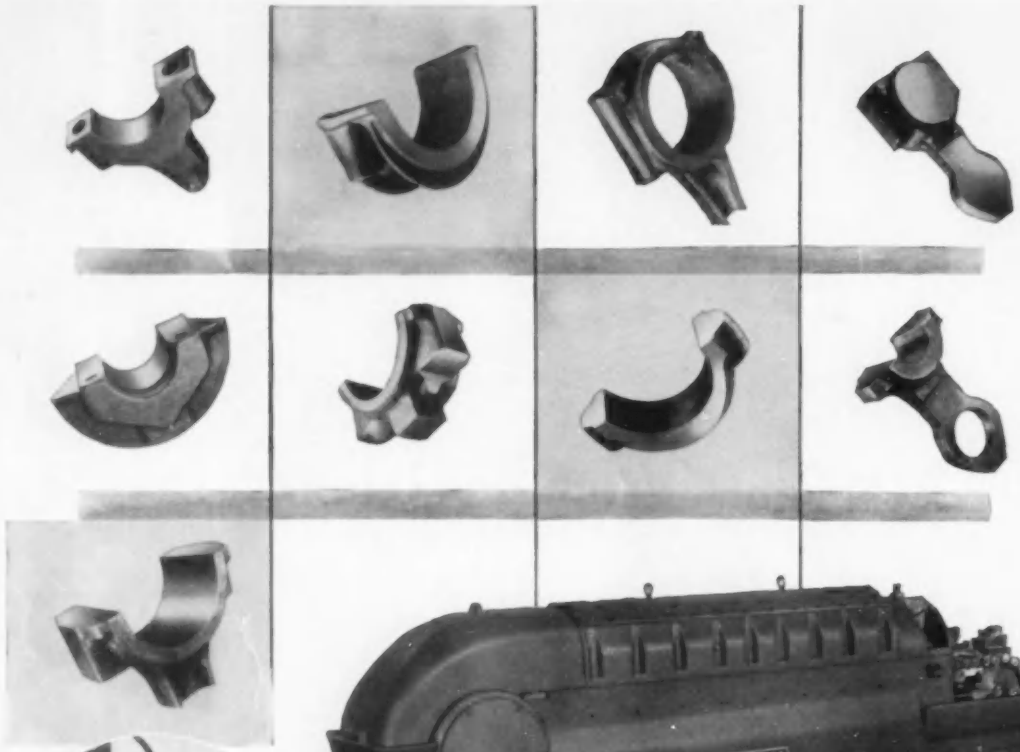

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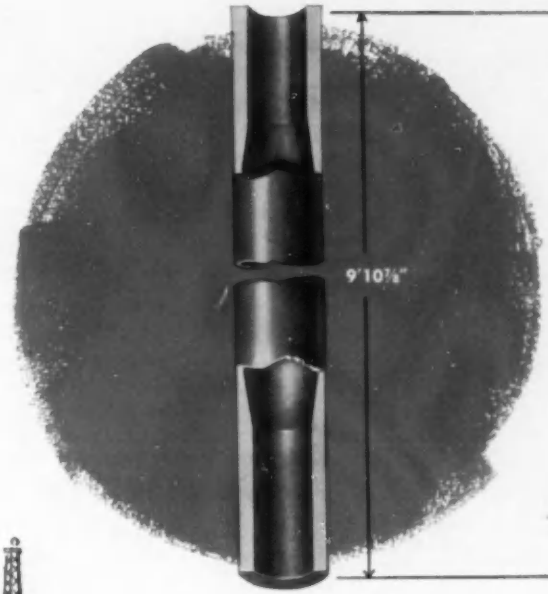

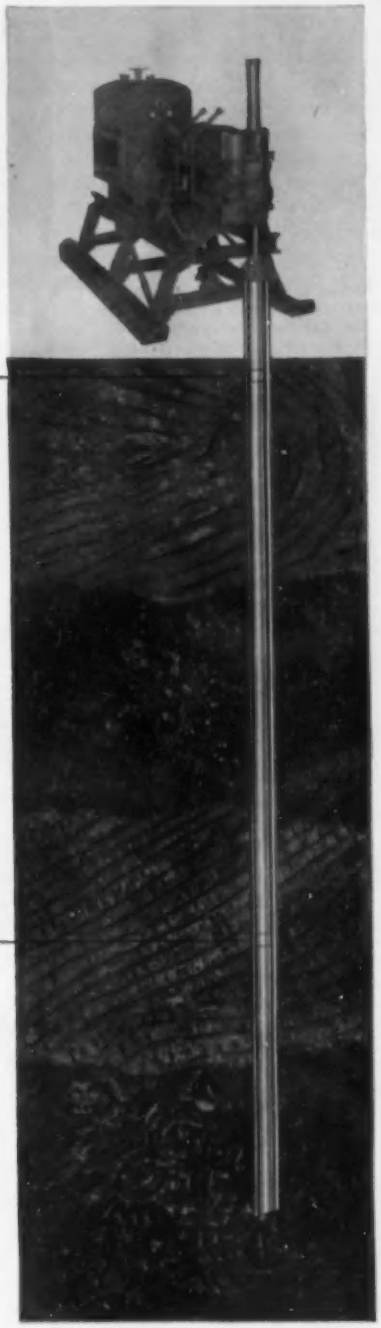

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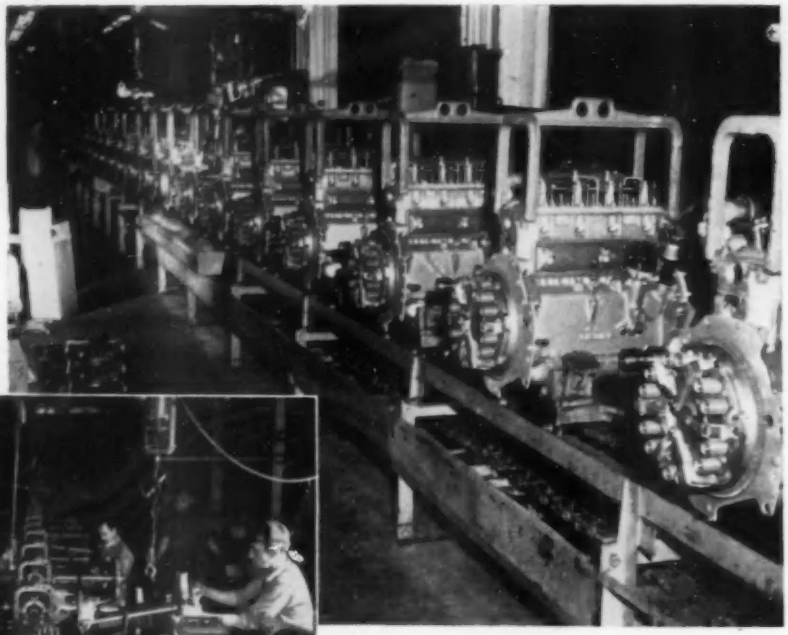


Above is perspective view of section of engine conveyor line.

Below is view of rear axle assembly being completed on the special conveyor ahead of assembly with the transmission.

By Joseph Geschelin

Ford Expanded Tractor Plant Has Over Four Miles of Conveyors

With the introduction of the expanded line of tractor models for 1955, Ford Tractor Implement Division unveiled its advanced facilities for the manufacture and assembly of farm tractors at the Ford Highland Park plant. It is significant that some years ago (see AI, January 1, 1948) when tractor operations were first moved to Highland Park, material handling was considered a basic element in the manufacturing scheme. The same philosophy governed the development of the new plant, except for the amazing advances in techniques initiated during the intervening years.

The new plant, greatly expanded in scope, boasts around 32 different monorail conveyor systems totaling some 22,089 ft of conveyors. The inter-plant conveyor, the longest in the network, is about 2117 ft long. It transports 11 different parts such as cylinder blocks, cylinder heads, housings and cases, etc., from machining operations to the interplant washer, then to the unloading station for storing.

In addition to the network of conveyor systems of all types, automation devices of various types have been installed to further eliminate manual handling even to the functions of loading and unloading. Threading the heat treating department and serving transmission assembly is a group of some 10 unique automation stacking units developed for Ford by Michigan Production Engineering. These tall stacking

units represent the latest development in automation equipment, designed specifically for storing racks or baskets of parts of a variety of kinds to provide banks which can be drawn at will by the operator.

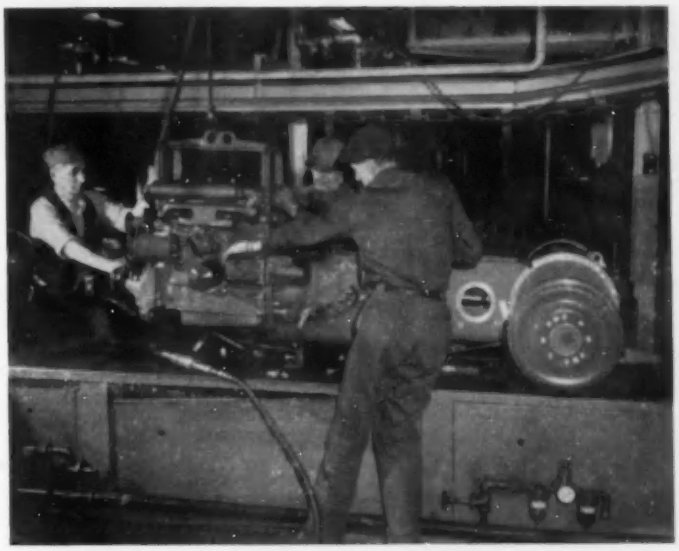
Just two years ago (see AI, February 1, 1953) we recorded the introduction of advanced transfer type equipment for machining cylinder blocks and heads for the then new Golden Jubilee four-cylinder overhead valve engine. Counting this equipment Ford now has a total of 17 transfer machines in its Tractor Plant, including three enormous Cross Transfermatic machines on transmission cases.

To simplify the problem of visualizing this important operation, the present article will be devoted entirely to a highspotting of automation, material handling, and assembly operations. The next article in this series will touch on the highlights of transfer machines, some comment on gear production and testing. Even a series of survey articles necessarily will fail to do justice to the overall picture.

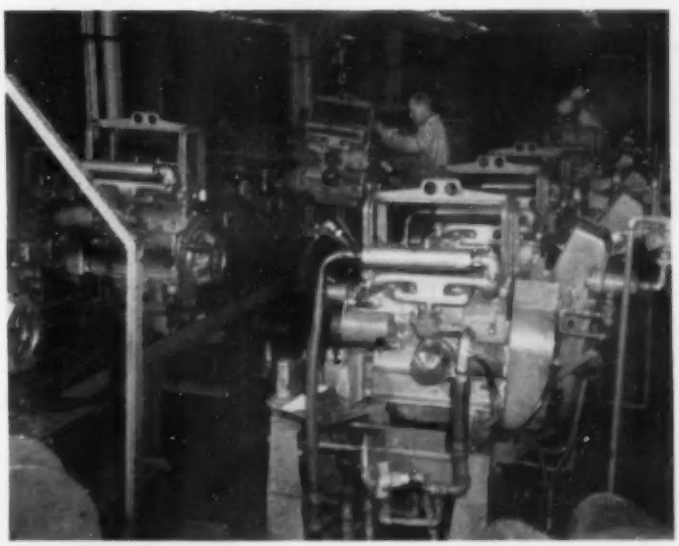
In commenting on features of the assembly operation, it is interesting to note that scheduling is handled by Teletypewriter equipment consisting of a master sending station and nine receiving stations. The latter are spotted in the following basic locations: transmission assembly, engine assembly, center housing machining, axle housing, front axle and pedestal, instrument panel assembly, tire assembly, gas tank and hood sub-assembly. This system of communications is vital in handling the variety of tractor models, two different basic engines, and variations in basic elements such as the four- and five-speed transmissions and live power take-off.

Let us start first with final assembly operations. At the extreme end of the assembly department is prepared the rear axle assembly. Rear axles move on a conveyor to a slat conveyor section for installation of the transmission, followed by engine installation to complete the backbone of the tractor. Nearing the end of the slat conveyor, the engine is fitted with a sling for attachment to a hook on the monorail assembly conveyor. The conveyor also carries a large sling which is designed to engage the rear axle at both ends, making engagement automatically. The monorail dips downward to the slat conveyor, engages the backbone, lifts it off the conveyor and becomes a part of the final assembly line from this point on.

At this point are installed the front axle, hydraulic lift mechanism, and other minor parts. Then the conveyor changes direction to transport the major sub-assembly to the paint shop on the second floor. Here the conveyor enters the first stage of the paint system—a large Mahon water back spray booth. As a tractor is about to enter the booth, an electric eye triggers automatic spray guns mounted on the lower edge of the booth, painting the underbody auto-



Engine assembly meets the transmission on the slat type buckle-up conveyor.



All engines are hot tested in this department. They are run under power, checked for oil and water pressure, and valve clearance adjusted.

matically. Two operators in the booth tnen spray the chassis from both sides in conventional manner.

Leaving the paint booth the chassis enters a Mahon drying oven some 1824 ft in length, the last stage of the oven being a cooling tunnel, lowering the temperature of the mass sufficiently to enable operators to handle it safely.

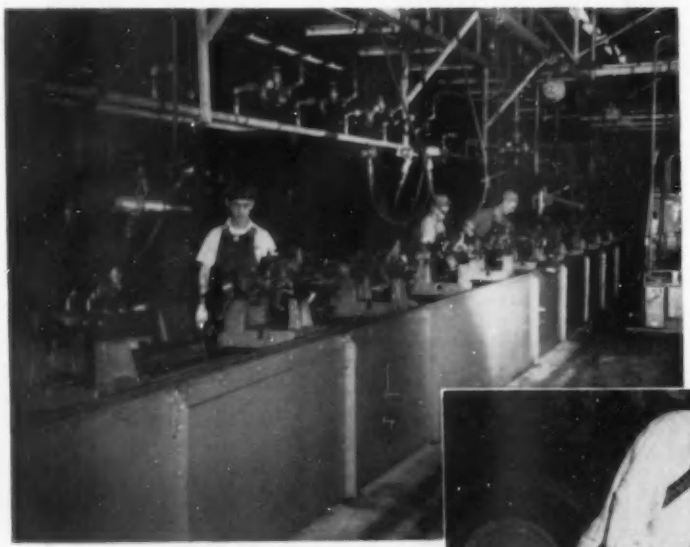
As the chassis leave the exit end of the drying oven they continue on the overhead conveyor which, at this point, becomes another sub-assembly line for installation of wiring harness, fenders, and instrument panels.

The overhead conveyor changes direction again, moves down to the assembly floor to meet the final assembly slat conveyor onto which the chassis is lowered, the rear axle hooks disengaging automatically. Just before the drop is made, wheel and tire assemblies are installed and fastenings made up, using six-spindle pneumatic nut runners. The slat conveyor is flush with the floor, 78-in. wide, 430 ft long. As the chassis proceed on this line, operators install gas tanks, hood assembly sheet metal, and other parts required to complete the final assembly. Near the end of the line the conveyor is enveloped by an overhead closed rail system, carrying 1250-lb weights for testing the operation of the hydraulic hoist mechanism. The weights are suspended from hoists, lowered into place by the operator for inspection.

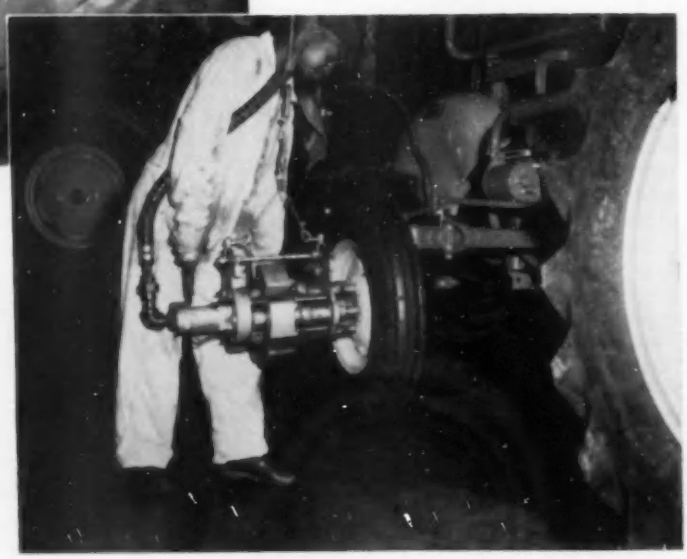
Meanwhile, sheet metal parts such as fenders, hoods, etc., received from outside stamping sources, including Dearborn, are mounted on revolving cylindrical fixtures, two sets to a fixture, and move on an overhead conveyor line to the paint shop on the second floor. Fixtures move first through a Mahon washer, then a drying oven, then enter a Mahon water back type paint booth where they are painted automatically.

Distinctive feature of the automatic paint system is the installation of four Schweitzer Equipment automatic spray gun cabinets, two for interior spray, two for the exterior. As the cylindrical fixtures enter the first station, they are caused to revolve in one direction while the interior is given its first coat; then the fixture is moved to the next station where it is revolved in the opposite direction for application of the second coat. The same procedure is followed in applying the two exterior coats in the second battery of automatic spray machines. Following touchup the fixtures go through a drying oven and the parts then are ready for installation.

One of the major improvements in techniques is the installation of a rear wheel and tire assembly conveyor complete with automation. About 120 ft in length, this conveyor incorporates an automatic



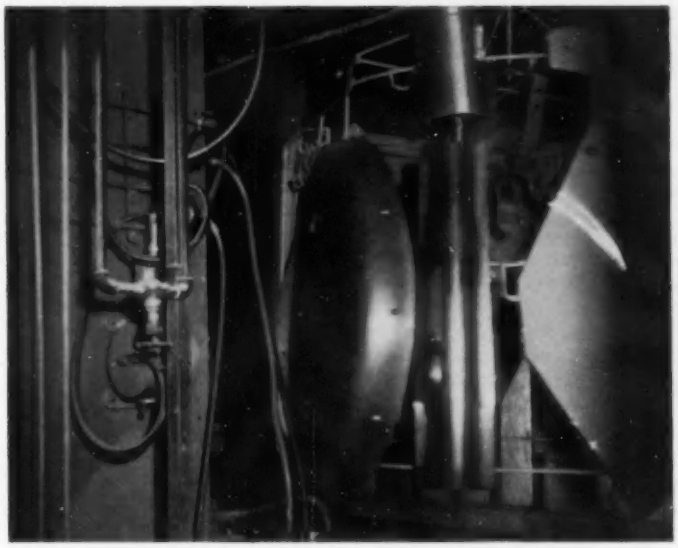
Hydraulic lift assemblies—a major feature — are assembled on this power driven conveyor in an air-conditioned area.



As tires are mounted on the suspended chassis, all six wheel lug nuts are tightened simultaneously by means of this Thor pneumatic multiple nut runner.

mounting station in which the tire is rolled over the rim, an inflation station, automatic pick-up and automatic drop-off.

In addition to the network of conveyors and supplementary automation devices mentioned above, Ford has installed some unique automation equipment designed primarily to facilitate storage and distribution of banks of parts. Among these is a group of ten or more tall storage racks, appearing to the eye as multiple tiers of gravity roller conveyor sections. Located in the heat treat section, they are designed to store baskets of gears and shafts after green machining, ready for heat treat; and following heat treat ready for grinding. Each of these storage racks is equipped with an intricate system of electronic control, making it a simple matter for an operator to schedule baskets of parts for storing on a specific tier and unloading according to schedule from any tier.



Large sheet metal parts, two sets at a time, are mounted on special cylindrically shaped fixtures for automatic spraying in a large Mahon booth. This is a close-up of one of the fixtures, mounted on a revolving head at the conveyor. One of the automatic spray gun machines may be seen at the extreme left.

On the slat type final assembly conveyor. One of the major steps is that of testing the operation of the hydraulic lift mechanism. Here may be seen the 1250-lb weight attached to the lift mechanism, loading the lift to permit final adjustments for stopping and starting positions.

Each of these racks is served by an elevator at one end. This provides the means for sorting as well as unloading. There is also a system of automatic unloaders, located primarily in the heat treat areas, designed to unload baskets automatically from the overhead feeder conveyor, depositing them on the gravity roller conveyor leading to the elevator serving the storage racks. Similar devices serve to pick up baskets unloaded from the storage racks and attach them automatically to the conveyor going to the grinding department.

It is also a matter of interest that the entire operation of producing and assembling the hydraulic lift units has been centralized in a separate area, held under conditions of constant temperature and dust free. The department is equipped with a large tunnel type Centri-Spray washer for chemically cleaning all component parts. A battery of special test machines also is provided for checking the operation of each assembly.

Still another distinctive automation device is the Service Conveyor carousel storage unit. There are six of these compact units spotted in the transmission gear department to provide a 16-hour stock float. Baskets of parts enter the unit and are moved along the serpentine-shaped conveyor for storing until the parts are required. This arrangement is said to increase machine operating efficiency, reduce handling, and reduce manual effort.

Another article devoted to Ford's Highland Park plant will appear in an early issue.

New and Old Vehicles Displayed at Swiss Show

By Robert Braunschweig

GENEVA, SWITZERLAND

THE 25th International Geneva Motor Show, held March 10 to 20, featured an exhibition of historic motor vehicles in addition to the latest products available. Newest of the vehicles was Fiat's rear-engined 600 Model which was described and illustrated in the April 1 issue of AUTOMOTIVE INDUSTRIES. The historic motor vehicle show displayed approximately 30 automobiles between 70 and 15 years old. This attractive exhibition was held in celebration of the 25th international show and included such vehicles as the 1886 Daimler, a 1898 Oldsmobile, a 1906 Ford, a 145 mph "razor blade" Panhard racing car of 1925 and the Chenard & Walcker 1.1 litre winner of the 1926 Le Mans race.

Technical advancements and new models included the following: Fiat 1100 TV two-passenger sports convertible with wrap-around windshield; Mercedes-Benz 190 SL two-passenger sports convertible in production form; Maserati two litre, two-passenger sports roadster; and various special bodies by Swiss and Italian manufacturers.

Among the U. S. cars the Studebaker second series 1955 with ultra vista windshield and the Speedster with a 188-hp engine were shown for the first time.

New commercial equipment included a Saurer underfloor bus engine with mechanical supercharger on a 220-hp engine, Hanowag 4x4 cross country truck, and Morris truck with five litre Diesel engine. In addition, numerous new coach bodies by Swiss and German firms were exhibited.

A number of Autoscooters (the modern European version of the cyclecar) were shown in modified form. The Messerschmidt, for instance, is now a much improved vehicle with better springing and is capable of over 60 mph. This is a three-wheeler which is produced in considerable numbers. In contrast to this the German Fuldamobil and the British Bond three-wheelers have side-by-side seats.

Since motor vehicle imports to Switzerland are unrestricted (with the exception of trucks over five tons capacity) and as there is no national passenger car industry, the Swiss market provides a comprehensive picture of how the various makes are accepted by the public.

As the included tables show, German passenger cars are providing more and more of the new registrations and have risen to the figure of 54 per cent in 1954. The remainder of new private passenger registrations was nearly equally divided by U.S.A. (13 per cent), France, Great Britain (11 per cent each) and Italy (10 per cent). It is expected that the Italian and French share of the Swiss market will increase slightly in 1955.

Among the U. S. makes it is to be noted that General Motors and Plymouth have assembly plants located in Switzerland, whereas the Swiss market, as far as Ford is concerned, is covered by the Ford (Belgium) S.A. of Anvers. This explains the fact that Chevrolet and Plymouth, which have been engaged in a struggle for U. S. leadership on

The Swiss Passenger Car Market

Registration Figures According to Makes

(makes with over 1000 registrations in 1954)

	1954	1953
Volkswagen	8972	8235
Opel	7246	5595
Ford (all countries)	4351	3589
Fiat	3906	3851
Mercedes-Benz	1663	717
Renault	1378	1098
Chevrolet	1335	1365
Peugeot	1300	1269
Plymouth	1242	1216
DKW	1080	523
Vauxhall	1042	1034

Registration Figures According to Countries of Origin

Germany	22,833	17,677
USA	5,271	5,234
France	4,653	4,324
Great Britain	4,572	4,264
Italy	4,280	4,112
Tchecoslowakia	111	88
Others	6	15
Total	41,726	35,714

Registration Figures of American Makes

Chevrolet	1335	1365
Plymouth	1242	1216
Ford	627	525
Studebaker	511	540
Willys (Universal Jeep)	426	327
Buick	168	113
Nash	153	215
Dodge	141	151
Hudson	126	85
Willys	105	169
Oldsmobile	93	101
Chrysler	81	82
Cadillac	74	89
Mercury	69	75
Pontiac	64	101
De Soto	24	44
Lincoln	17	24
Packard	10	6
Kaiser	5	6

Figures by courtesy of Chambre Syndicale Suisse de l'automobile.

the Swiss market for several years, are providing the bulk of American - designed passenger cars. Ford, on the other hand, is doing well with the German and British made smaller cars. According to manufacturing groups, first place is held by General Motors, followed by Volkswagen, Ford and Fiat. It is unlikely that this picture will change much in 1955.

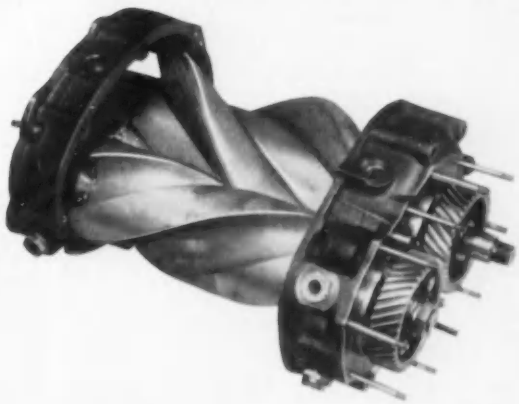
Apart from local trends the Geneva show 1955 was notable for the number of sports and high performance cars shown. The new Mercedes-Benz 190 SL, which was shown in prototype form some 15 months ago in New York, has now been finalized and is equipped with an ohc, two-litre, four-cylinder engine designed on the lines of the 220 and 300 six cylinder power units and considered by many as a forerunner of a new passenger car engine. It develops 125 hp at 5700 rpm with premium fuel and has a maximum torque of 114 lb ft at 3800 rpm. It uses the stiffened up floor of the 180 type passenger car and features both the "horseshoe" engine carrier, connected by rubber to the floor, and the single joint rear swing axle as used on the 220 type car. Wheelbase is shortened to 94.5 in., and weight is 2560 lb. All four speeds are fitted with a blocker ring type synchromesh device. In Switzerland the price of this car is in the range of the Chevrolet V-8 Bel Air hardtop coupe. For competition lighter, windowless doors and twin aero screens can be fitted.

The presentation of the new Fiat 600 was noteworthy for several reasons. The car was announced to the press officially on the eve of the show, and several hundred vehicles of the new type were already circulating in the City of Geneva at the time of the opening of the exhibition. Delivery for customers was said to be immediate. The Italian coach builders presented no less than six special versions of the

(*Turn to page* 172, *please*)

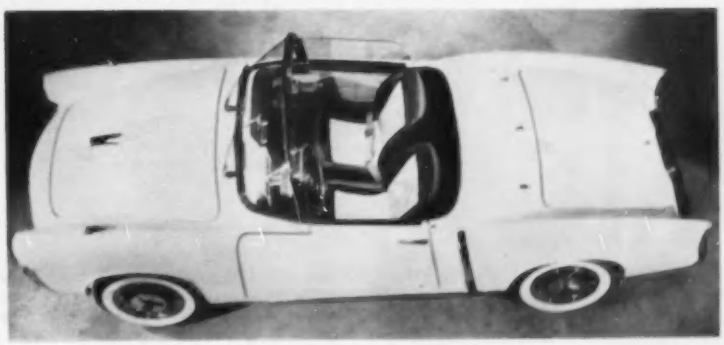
Dodge Firebomb convertible built by Ghia-Turin for Dual Motors Corp., Detroit, Mich.

Alvis three litre is marketed with Graber bodies in Switzerland. Wasserman photo



Rotor assembly of supercharger for Saurer Diesel engine

Fiat 1100 TV sport convertible



American Methods Fitted to German Conditions at Volkswagenwerk

By David Scott

WOLFSBURG, GERMANY

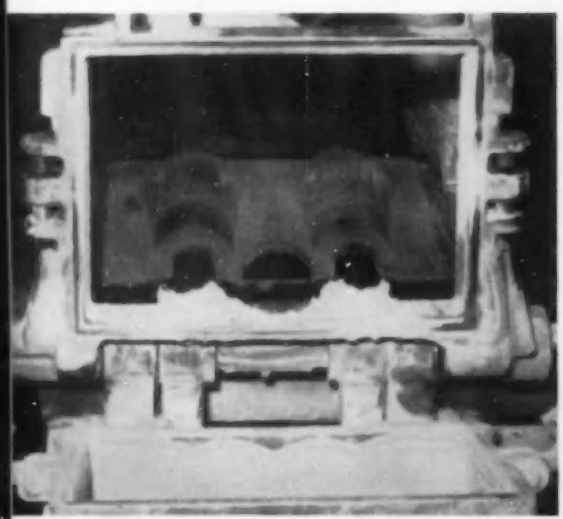
THE Volkswagenwerk is one of Europe's biggest automobile factories, whose current daily production of over 1000 vehicles is the largest for any single basic model outside the Big Three in America. Since 1945 there has been continuous growth at the Wolfsburg plant, where total floor space is now 4¾ million sq ft and employees number 25,000. American methods adapted to German conditions are featured, many of the engineers have had experience in the US, and American machines are much in evidence and highly regarded.

Yet the introduction of automation has been only gradual. Space is not at a premium on the lonely marshland 45 miles east of Hannover, and average wages (although the highest in Germany) are only the equivalent of 52¢ an hour. In addition, the German machine tool industry is not readily able to supply VW's advanced needs, and American equipment is found expensive and costs dollars.

On the other hand, further expansion of plant and output is planned, but labor is extremely short in the area. (For every additional worker employed VW must build new living accommodation at Wolfsburg.) Thus compromise measures have been necessary, and VW has designed, made or improved many of the new installations which are now boosting production.

The car itself is distinguished by a rear-mounted air-cooled engine with magnesium castings for crankcase and gearbox. This is of flat-four construction of 72.5 cu in. displacement. Independent torsion bar suspension is used all around. The chassis is a pressed steel floor, braced by a central tunnel which forks at the rear to support power and transmission units.

Sixty-five per cent of all parts are made locally by VW, including the welded body, all gears, and most castings. The reason for this high proportion is again the inability of most of the German suppliers to cope with the volume required. As a result, VW



A cured shell mold is removed by hand from the pattern when it emerges from the oven. Four patterns are in use in each of the five shell molding setups for engine cylinders.

Completed shell molds, together with cylindrical cores, are paired and assembled with metal clips. No adhesive is used.

has had to extend itself in many directions at once.

The foundry is claimed to be one of the most modern in Europe. Individual cast-iron cylinder barrels are made by shell molding. The half-shell for a pair of finned cylinders is formed on hand-operated dump box machines, the sand bonded with 4½ pct resin. After inversion, the coated pattern is released from its frame, and rolled into the open quadrant of an adjacent rotary oven for curing.

At the same time, a cooked shell emerges from the oven. This is lifted off its pattern and placed on a flat steel plate for initial cooling. One operator handles the complete cycle, and output is about 55 shells per hr. Five such machines are used. Cylindrical core shells, open at one end, are made in the same way.

A new semi-automatic machine for making the cylinder shells has been installed and is now coming into operation. It consists of a ring conveyor carrying a continuous line of patterns under a sand hopper and through a semi-circular curing oven. Production is stated to be about 270 shells per hr, with a two-man team needing only to remove the baked shells, spray the pattern with silicon lubricant, and release a measured quantity of sand-resin mix.

For assembly, two cores are sandwiched between two shell halves which are joined by simple metal spring clips. No adhesive is used. Two pairs of molds are placed in a partitioned sheet-metal box, 140 of which are linked together on the circular casting conveyor. Sprue holes are covered with metal caps, and each box is packed with shot which also fills the hollow cores. Caps are then removed and the cast ironed poured. *(Continued on next page)*

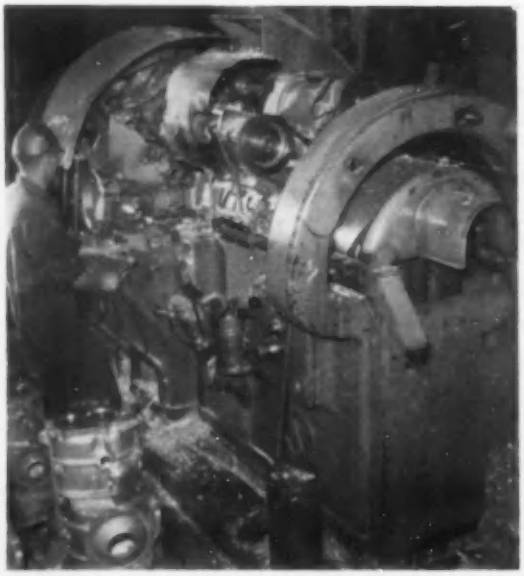
Twenty-three studs are screwed simultaneously into the crankcase on this multi-spindle machine. Studs are loaded into the guide slots by hand, and time for the complete cycle is 45 sec.

Shell molding pouring conveyor. Each box contains two pairs of cylinder molds. After filling with shot, the boxes move past the pouring station and then through an air-cooling tunnel. A five-man team operates the equipment, and output is 900 barrel castings per hr.

After leaving the cooling tunnel, rail-mounted casting boxes spill the shot and burnt shell mold on a separation grate and vibrating screen. Castings are extracted by hand.

In illustration above, risers are sawn off the magnesium gearbox castings on a double-sided eight-position machine.

In illustration, upper right, milling speed of 3600 fpm is used to face the magnesium gearbox housing on this double-sided Hurstall machine. Rough and fine milling heads on each side are 19 in. diam, and run at 950 rpm. Eight-position fixture makes one revolution in 6½ min.



Seven-position rotary fixture on this Vomag automatic carries assembled gearbox housings for machining ball joint surfaces on both sides. The three work-stations bore the half-axle hole, face the ball, and mill the mounting flange. Output is 30 units per hr.

Cooling is by air blowing as the boxes pass slowly through a tunnel. At the end, the boxes tip, shot and burnt mold spill onto a separation grate, and castings are extracted manually. Output of this line is 900 cylinder barrels per hr.

Volkswagen also uses shell molding for the reduction gear housing fitted to each drive wheel of its eight-passenger Microbus (basically the same as the car), and for aluminum cylinder head cores. Cast-

Volkswagen built five-station transfer automatic machine from an Eitel hydraulic press. Broached and bored connecting rods are hand-loaded onto locating pins of the endless indexing belt. Work covers deburring bolt holes, chamfering small end, pressing in bushing, milling lock slot, and drilling three oil holes in the small end. All feeds are controlled by the tool-carrier plate on its downward stroke. Work clamping is used only in the fourth (milling) station. Small end bushings are normally loaded into the gravity chute by an automatic hopper.

ing of camshafts by this method is planned for the future.

Magnesium castings for the split crankcase and transmission housing are formed in tilting metal molds whose body and cores are water-chilled. The magnesium section of the foundry has 26 gravity die casters, each with a four-man team and a separate holding furance. The hot metal is ladled by hand. Castings are dipped in a nitric acid solution for anti-corrosion, and risers are sawn off.

The use of magnesium is favored by VW on account of the uncertain quality of some German cast-iron, and because magnesium helps keep the car weight down to 1530 lb. Ease of machining is felt to compensate for the higher cost. Normal milling speed for facing the gearbox housing, for example, is 3600 fpm, the upper limit being set by the spindle bearings rather than the metal. Tool life is long, and milling cutters are sharpened only once a month. The fact that magnesium can be cut dry (it must be, according to German law) is cited as another advantage. After a few initial mishaps, there is now reported to be little serious trouble with fires.

The lightness of magnesium is one reason why VW has been slow to use full automation on its machine lines. The largest castings weigh only 12 lb, and it is felt that these can be easily handled manually. It is also argued that the soft metal is easy to damage by clamping. In addition, automation would require an extensive outlay, since the present engine comprises two crankcase halves and four individual cylinder barrels in contrast to one casting for the conventional in-line or V-form unit.

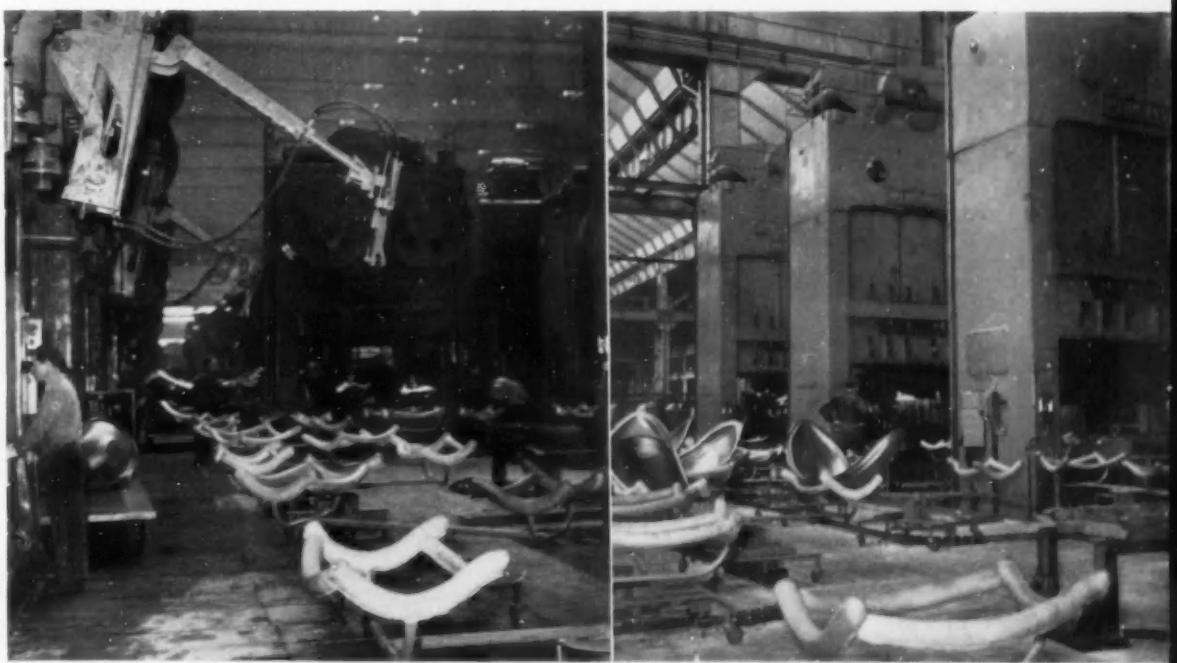
For the crankcase there are two parallel lines of 30 multi-spindle machines, one for each half, with manual transfer and loading. Most of these were built by VW, and many have hydraulic or air clamping fixtures.

Seventy pairs per hr are completed by 78 men on each of the two shifts. There are similar lines for the split castings which house the gearbox and differential.

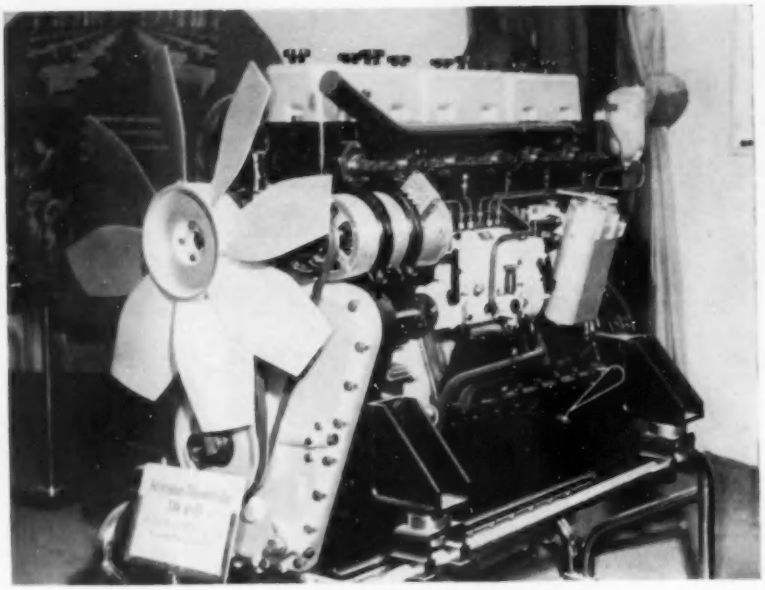
One example of individual machine automation is a small six-station unit for connecting rods. This is built from a simple hydraulic press with tools and drive motors carried on a common plate whose vertical travel is controlled by the ram. Operations include deburring bolt holes, chamfering small end, pressing in bushing, milling lock slot, and drilling three oil holes in the small end. Connecting rods are conveyed between stations by means of an indexing transfer belt.

Another set-up made by VW is for machining the bolts holding the king pins to the front suspension arms. Here four single-spindle automatics chamfer and cut off the round bar stock. Cut lengths fall via gravity chutes onto a belt and thence to a washing

(*Turn to page* 150, *please*)



Sahlin Iron Hands on first drawing press drop left and right hand fenders onto leather covered transporter cradles. A drag chain conveyor moves the dollies between the next three 500-ton presses for further forming. Radial fingers at the base of each swiveling crossarm engage pegs in the floor when reversal of the cradle positions is necessary for correct loading and unloading.



Newest East German six-cylinder Diesel is rated at 225 hp at 1700 rpm.

IMPROVED COMMUNIST MODELS at Leipzig Fair

LEIPZIG, EAST GERMANY

AUTOMOTIVE trends revealed at the Leipzig Fair in March show that the Communist countries are slowly broadening the range of their engines, vehicles and tractors. Emphasis in most cases is on increasing the utility and application of existing equipment and expanding production of improved models rather than on undertaking any radically new designs.

East Germany exhibited a number of medium-powered Diesels, the newest of which was a six-cylinder unit with a maximum output of 225 hp at 1700 rpm. This engine, designated as model SM 6-17, is intended for heavy road vehicles, construction and earth-moving equipment, and industrial locomotives. It has a piston displacement of 1165 cu in., with a bore and stroke of 5.9 and 7.08 in. and an 18 to 1 compression ratio.

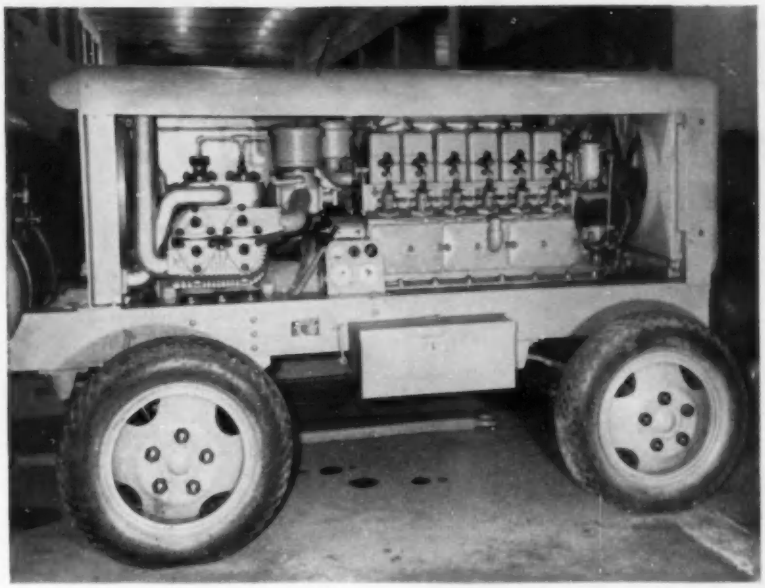
Crankshaft is cast steel, block and crankcase are a single casting, and wet cylinder liners are used. There is indirect injection to swirl chambers machined in the cylinder heads, which are cast in pairs. Principal external feature of this unit is the massive eight-bladed cooling fan which is an aluminum die casting.

A smaller engine made by the same factory in East Berlin is the SM 4-17 rated at 150 hp at 1700 rpm. With four cylinders of the same bore and stroke it has a piston displacement of 775 cu in.

Production of the two Horch three- and six-ton general purpose trucks is continuing at the Zwickau

Diesel engine of this East German tractor can use one of its four cylinders as a compressor for tire inflation.

Frame ½-ton pick-up made in East Germany has side and rear doors for loading. It is powered by a 55 cu in. three-cylinder, two-stroke engine.



By David Scott

Trailer-mounted Diesel-compressor made in Chile. The four-cylinder engine drives a V-4 aircooled compressor.

The East German KS 07 crawler tractor, powered by a 528 cu in. Diesel developing 60 hp at 1150 rpm, has undergone several changes. It now features a rubber-mounted body, all-weather cab, new radiator grill, aircraft-type steering wheel, and self-cleaning oil filter. With further modifications, this machine is offered as a bulldozer with a 7-ft wide blade hydraulically operated. The RS 04 wheeled tractor also appeared in improved form. This has a four-cylinder, 40 hp Diesel running at 1250 rpm. A special feature is the ability to use the No. 4 cylinder as a compressor for tire inflation while the engine runs on the other three.

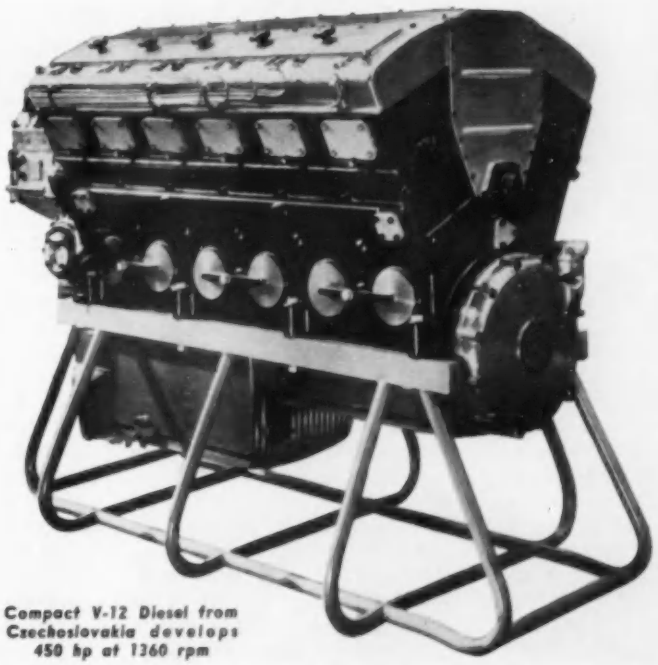
(*Turn to page* 104, *please*)

factory, although it was stated that manufacture of the engines will be transferred to the Dieselmotorenwerk at Schönebeck next year as part of a rationalization scheme. The latter plant specializes in small generating and power equipment. The Horch H6 and H3 chassis have similar six- and four-cylinder Diesels which are rated at 120 hp and 80 hp at 2000 rpm.

In the passenger car line, East German production is concentrated largely on the three-cylinder 55 cu in. IFA F9. More body variations are being introduced for the basic engine and chassis, and the latest is the Framo eight-passenger bus, type V 901/2-Z, made in Hainichen, Saxony. The body has a large window area, passenger doors on the side, and a waist-high rear panel, hinged at the top, giving access to a small luggage compartment. Similar coachwork is used on a ½-ton panel van.

A hardtop sports coupe is now being made at Eisenach. Known as EMW 327-3, it has a six-cylinder, ohv engine of 120 cu in. displacement rated at 57 hp at 3750 rpm. Twin Solex carburetors are used, but the compression ratio of only 6.1 to 1 reflects the low octane rating of the synthetic gasoline which is all that is available in East Germany.

One small private manufacturer, Louis Krause of Leipzig, exhibited a new midget car with a rear-mounted, aircooled engine. This five hp unit chain-drives the rear axle through a three-speed gearbox. Body is aluminum, and the clear plastic sun-roof extends down the back to form the rear window.



Compact V-12 Diesel from Czechoslovakia develops 450 hp at 1360 rpm

Start of the engine assembly line. Blocks are being loaded, upside down, on the saddles so designed as to support the engine either upside down or right side up.

A section of the engine assembly line —piston and rod installation.

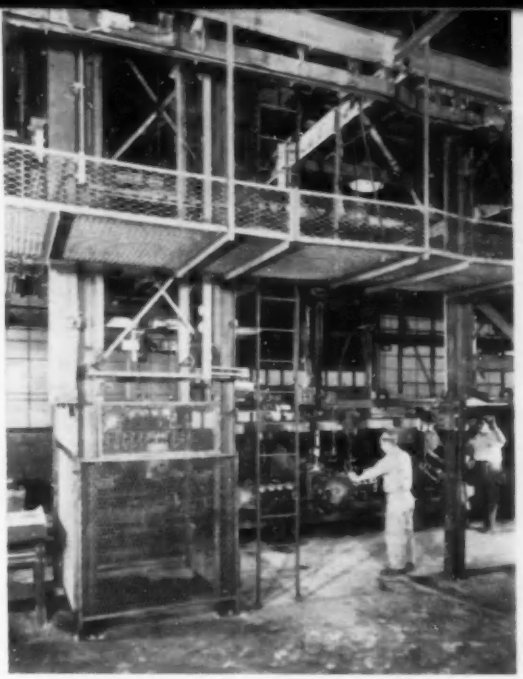
Balancing and Assembling

By Joseph Geschelin

SOME of the highlights of segmented automation equipment for producing cylinder blocks and heads for the Chevrolet V-8 in the new Chevrolet engine plant in Flint were described recently (see AI, Jan. 15, 1955). This article, the second of a series, deals primarily with some of the features of engine assembly; engine balancing with its associated automation equipment; and engine testing.

The two final assembly lines, only one of these in operation at the time this article was written, are located at the outer edge of the department well away from the machining area. As illustrated, the assembly line conveyor is of slat type, mounted directly on the floor without a pit, and runs some 467 ft in length. Component parts are delivered to the line on overhead conveyors in the usual manner, dropping down to the proper level at points of usage. Unlike other engine assembly conveyors installed in recent years, the Chevrolet line does not employ pedestals. Instead, it has the rigid four-post mounting, illustrated, designed in such fashion as to accommodate the engine right side up or upside down. Engines are mounted on the fixtures without clamps or fastenings.

In keeping with the modern practice, Chevrolet balances the sub-assembled engine — before the heads and pan are installed — using a battery of specially-designed GMR balancing machines. There is an important departure in technique, however. Whereas engines usually are balanced dry, Chevrolet has special arrangements in its equipment to supply full



A section of the J. B. Webb power and free electronically controlled conveyor which transports engines from the assembly line to the dynamic balancing machines. No loaded 'hook' can move into the elevator until space there is free. Once hoisted, the hook and its load are moved automatically across the aisle to the battery of dynamic balancing machines and lowered into one that is not in use. After test, the engine, still in its hook, is returned to the assembly line.

ance crankshafts to 5-oz in. so as to leave the final sensitive balancing for the assembled state.

Following acceptance, the engines on their carriers are transferred to the power section of the conveyor, ready for return to the assembly line. Here again the engine meets the elevator, is transferred to the elevator, lowered to the assembly line, and automatically transferred onto the four-post fixture. If the assembly line is not prepared to handle an engine when it arrives at the elevator, the conveyor will continue its course, leaving engines stored until ready for the drop.

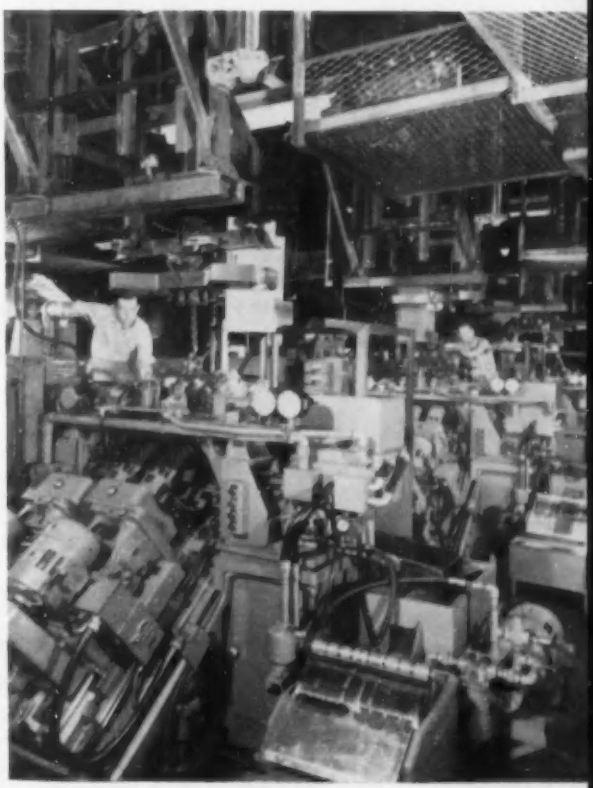
A noteworthy feature of the balancing procedure is

——Chevrolet V-8 Engines

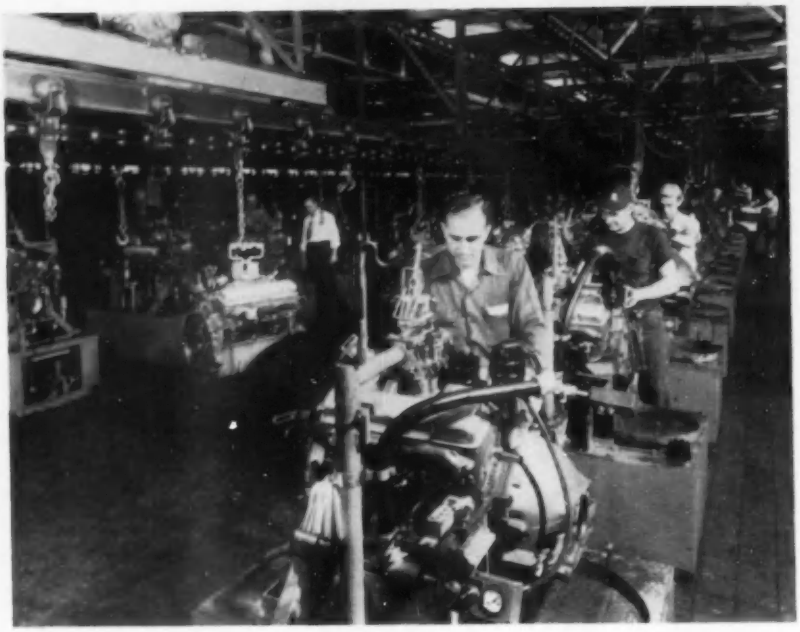
pressure lubrication to all bearing points while the test is in progress. It is felt that this procedure more nearly approaches actual operating conditions.

The linkage between the assembly line and engine balancing, as well as the return of engines to the assembly line, is accomplished automatically by means of a system of power-and-free automation installed by Jervis B. Webb. As the engines reach the section of the assembly line where they are ready for transport to balancing, they are lifted off the assembly stand, transferred to the elevator (see illustration), hoisted upward and transferred to a carrier on the automation conveyor. This entire sequence of operations is intended to be fully automatic.

Engines then are transported to the GMR balancing machines where each engine in order is accommodated in one of the machines for balancing. Each of the balancing machines is equipped with four W. F. & John Barnes drill heads, arranged two on each side of the crankshaft. Final balance is held to 0.5-oz in., each engine being rechecked in the machine to verify the correction. Incidentally, it is current practice to bal-



Battery of engine dynamic balancing machines. Note that conveyor hook is still attached to engine. Here, with all reciprocating parts assembled, the engine is cycled at 700 rpm, dials indicating its out of balance, fore and aft. With the engine stopped, drills are advanced, drill into the counterweights to the automatically established depth. The engine is cycled again to check, after which it is hoisted and returned to the assembly line.



Engine test area where each power while checks for oil engine is run under its own ow, leaks, and other possible defects are made. From here the engines go to the paint booth, thence to the loading dock.

the provision of a master engine, painted in distinctive color for ready identification. This engine travels continuously on the conveyor line and as it approaches a balancing machine at regular intervals, the operator will accept it and use it to check the calibration of the machine.

After the balanced sub-assembly returns to the final line, it continues on the line for completion of the assembly operations. At the end of the conveyor, engines are transferred by hoist onto an overhead feeder conveyor for transport to the test stands.

Chevrolet has a large battery of fixed test stands served by the feeder conveyor from the assembly line; they dispense with automation handling in this area. The management has found it more expedient to schedule engines at the will of the operator, thus making it possible to complete the inspection run and make tinkering adjustments if need be, without resorting to an automatically timed cycle of events. Too, this eliminates the complication of removing an engine for repairs and shunting it to a special repair area, thus dispensing with multiple handling and storing.

The test cycle is simple and of short duration, designed primarily to run the engine, adjust valve lash, and make a visual inspection for leaks as well as test effectiveness of lubrication to the valve mechanism.

Accepted engines then are transferred to the feeder conveyor leading to the spray booth where they are painted the standard color, and are ready to ship.

Additional quality control is exercised by the engineering department to assure conformity with specifications as well as to check on performance characteristics. To this end engines are selected at random directly off the assembly line and transported to the dynamometer test cell, illustrated. Here the sample engines are given a full dynamometer test schedule. By this means it is possible to maintain a watchful eye on the course of production and to reveal adverse combinations of tolerances that might result in variations in performance.

The next article in this series will cover some of the highlights of making pistons, connecting rods, and crankshafts.

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U. S. Considering Buying New Vehicles for Fleet

Car and truck manufacturers may soon be getting some sizable orders from the Government for vehicles. The average age of the Government's commercial vehicles is about five years, and it feels that many of these worn-out units should be replaced because of increasing expenditures for repairs and maintenance.

Excluding combat and tactical units, the Government's inventory as of last June consisted of 228,438 commercial vehicles, which have been driven almost two billion miles in one year. Although this mileage was almost the same as that of the preceding year, it was racked up despite the fact that the U. S. had 36,519 fewer commercial vehicles than in 1953. Costs for operating the entire fleet averaged about 7.2 cents a mile.

Six-Cylinder Engine Demand Expected to Continue Strong

Despite a trend toward more installations of V-8 engines in automobiles, six-cylinder power plants are still accounting for a substantial percentage of sales. William J. Bird, sales vice-president of Plymouth, predicts that the industry will turn out more than one million cars equipped with six-cylinder engines in the low-price field this year.

Mr. Bird attributes the continued popularity of the six to its lower cost and easier maintenance and service. Due to better fuel, carburetion, ignition, and combustion chamber design, manufacturers have been able to get more power out of six-cylinder engines without increasing piston displacement, he noted.

Automation Is Theme at SAE Production Meeting

AUTOMATION seemed to be the key word used at the SAE Golden Anniversary Production Meeting and Forum, sponsored by S. E. Bergstrom, vice president of Cincinnati Milling Machine Co., in Cincinnati last month. An extensive gathering of design and production engineers not only heard several definitions of the word, but also many pros and cons in the use of this one phase of our rapidly changing technological manufacturing processes.

There were eight panel or forum sessions held simultaneously during the first day of the three-day meeting. The second day was devoted to technical papers on various production phases; while the final day was devoted to plant tours to General Electric's Evendale Jet Engine Plant and to Cincinnati Milling Machine Company's facilities. The dinner speaker this year was Roy T. Hurley, chairman and president of Curtiss-Wright Corp., who spoke on "Economics and the Engineer."

Automation Defined

Getting back to this word 'automation,' the panel dealing with that subject defined it as, "machine tools for continuous automatic production." The panel members then added that of course automation to small manufacturers is the use of standard machine tools with materials handling devices between tooling. Some good advice for small producers was that they should utilize readily available tools and over-the-counter type of controls together with materials handling devices which have been standardized. With this type of equipment, the maintenance problem is kept to a minimum. Everyone agreed that automation provides a cleaner and safer place for the worker. It has, as we all know, provided us with a better standard of living and has reduced the machine operator's manual effort. Many people are concerned whether the word in itself is helping or hindering the manufacturing economy. There was a general feeling that it has been used rather indiscreetly; but in general, panel members believe that it is helping to define a new technological process.

It was pointed out that automation means a lack of versatility of machinery for a large manufacturer. However, this is not entirely true, since most of these tools are composed of general purpose equipment with sections of automatic material handling devices. A good example of this is the Dodge engine plant, where an automated transmission machine was transformed into a machine for manufacturing engine parts. There is an increasing trend, of course, for machine tools with automatic loading and unloading devices. Equipment such as this helps take the drudgery off the shoulders of the machine tool operator.

By Thomas Mac New

On the subject of automatic tool changing devices, the big question is, "when do you change the tools?" There are so many varying factors affecting tool wear that it would be a rather difficult job to establish some standard for a machine to automatically change tooling.

A very interesting paper was given by P. H. Kelley and J. T. Buckmaster, both of Chevrolet, on the subject of automation. This paper is presented herewith following the discussion of the eight panels. There are some very interesting comments set forth concerning the usage of the word automation.

New Holding Device

A unique clamping method was discussed in the forum on tooling and shop methods. This new procedure makes use of vacuum for clamping the work. The process is currently being used at North American Aircraft, and it was mentioned that there is no commercial equipment yet available. With the equipment approximately 18 tons of holding pressure can be obtained, utilizing a plastic holding table which has a cut-out containing a sponge rubber insert, thus eliminating all mechanical fixtures. According to reports, the process is very inexpensive, cuts down on vibration, and helps to eliminate warpage due to excessive clamping pressures. Members of this panel also suggested that tooling costs can be greatly reduced by specifying standard lines rather than specialized equipment.

Chipless Production

It was brought out at the forum on chipless production that there is a definite trend toward hot heading, and many headers are currently being mechanized. The usual thing was stated about powder metallurgy, that is, it can be used for unique parts, requires short lead time, low tool costs, and that the largest parts can be made up to about 22 in. diam. There was also a great deal of discussion concerning the new Roto-Flo process developed by Michigan Tool Co. This recently disclosed process is for the cold rolling of splines.

On the subject of production and materials control, there was a great deal of argument concerning realistic scheduling versus priority type of scheduling. The realistic approach, of course, requires a great deal of pre-planning. Of course, with a custom line or a job shop arrangement, the realistic approach is rather difficult, since there is no constant flow of material.

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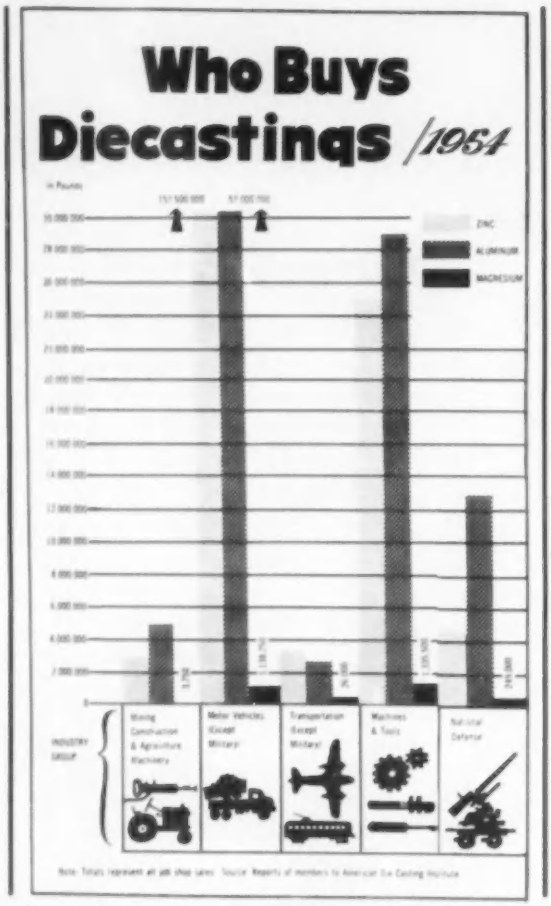

Usage of die castings by the automotive industries. This, of course, is the die caster's greatest market.

Many More Cars USE DIE CASTINGS *for Grilles*

THIS year marks a sharp increase in the use of die castings for automobile grilles. There are 16 different car models that are utilizing complete die cast grilles for 1955 and six others use die cast elements as a part of the front end styling treatment.

Because of this widespread usage by automobile manufacturers, the American Die Casting Institute believes that 1955 will be the best year in the history of the die casting industry. According to the American Zinc Institute, the trend indicates increased confidence by automotive engineers and designers in the stability of current zinc supplies and prices.

Compared with 1954, the 1955 automobiles use more than eight times the weight of zinc die castings for front end parts. According to W. J. During, president of the ADCI, "The tremendous tonnage of zinc utilized in the front ends of the new models—in addition to the normally die cast zinc parts used throughout the car—served as an impetus for the zinc industry to sell the automotive industry

A 1955 Packard grille 44 in. long by 7½ in. wide and weighing 10 lb has just been taken off the die casting machine. Another grille is in the cooling tank in the foreground.

on zinc as a basic engineering material."

Seventy per cent of the prime zinc is used for die castings, and of this figure, it is estimated that 60 per cent of the die castings are used for automotive applications. In 1954 job shop die casting sales for automotive and major oppliance use amounted to $268 million. This included the four basic die casting metals—zinc, aluminum, magnesium, and copper-base or brass. Zinc was the leader by weight. During 1955 the ADCI estimates a gross sale of $400 million in die castings. The major part of this will be the die caster's biggest customer—the automotive industries.

	Car Model	Front End Die Casting Weight (pounds)
General Motors Corp.	Cadillac	5.39
	Buick (Special & Century)	28.55
	Buick (Roadmaster & Super)	29.00
	Oldsmobile	7.62
	Chevrolet	13.00
Chrysler Corp.*	Plymouth	6.00
	Dodge	14.00
	DeSoto	22.00
	Chrysler	28.00
	Imperial	31.00
Ford Motor Company	Mercury	8.92
	Lincoln	8.94
	Ford	3.50
Studebaker-Packard Corp.	Studebaker	31.65
	Packard	39.93
	Clipper (Packard)	31.12
American Motors Corp.	Rambler	12.75
	Nash (Ambassador & Statesman)	22.85
	Hudson (Hornet & Wasp)	20.26
Willys Motors Inc.	Kaiser	23.25
	Willys	21.70

*Estimated

Pounds of zinc die castings for automobile front ends are indicated in table at right.

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PASSENGER CAR BODY WIDTH

By Joseph Geschelin

Used to Better Advantage in 1955 Models

ON several occasions since the end of WWII we have surveyed the shape of standard four-door sedans to determine how effectively maximum width was employed with respect to hip room and shoulder space. Such comparisons were not very fruitful until most makes had begun the shift from perwar body shells. The 1955 models, however, represent a complete sweep of entirely new designs and offer a fair comparison on any basis one may choose.

Characteristic of prewar and early postwar bodies was extreme width of exterior sheet metal but relatively cramped quarters for passengers. When hip room or shoulder room was compared with maximum width, the result was a considerable amount of "air" space that contributed little to passenger comfort with three adults in the rear seat.

COMPARISON OF 1955 AUTOMOBILE BODIES

	A Maximum Width (in.) (W-103)	B Shoulder Room Rear (in.)	C A—B / 2 (in.)
Willys	72.0	57.0	7.5
Studebaker	70.4	54.5	7.95
Dodge	74.5	57.8	8.35
Hudson	78.0	61.3	8.35
Nash	78.0	61.3	8.35
Plymouth	74.5	57.8	8.35
Chevrolet	73.8	56.4	8.7
Mercury—Montclair	76.4	57.5	9.45
Pontiac	75.4	56.4	9.5
Ford	75.9	56.8	9.55
Buick 40-60	76.2	56.7	9.75
Mercury (Custom, Monterey)	76.4	56.8	9.8
DeSoto	78.3	58.4	9.95
Lincoln	77.4	57.2	10.1
Chrysler C-67, C-68	79.1	58.4	10.35
Chrysler C-69, C-70	79.1	58.3	10.4
Cadillac	79.8	58.9	10.45
Oldsmobile	77.8	56.7	10.55
Nash-Hudson Rambler	73.5	52.3	10.6
Buick 50-70	80.0	58.7	10.65
Packard	78.0	55.5	11.25

This year the picture has changed completely. The table reproduced here was prepared from the body dimensions listed in the Statistical Issue of AUTOMOTIVE INDUSTRIES, March 15, 1955. Column A gives maximum overall width for each make, using the AMA designation "W 103" for this dimension. Column B is the corresponding shoulder room in the rear. Since this is generally less than hip room we believe it represents a limiting dimension from the standpoint of seating comfort. *(Turn to page 106, please)*

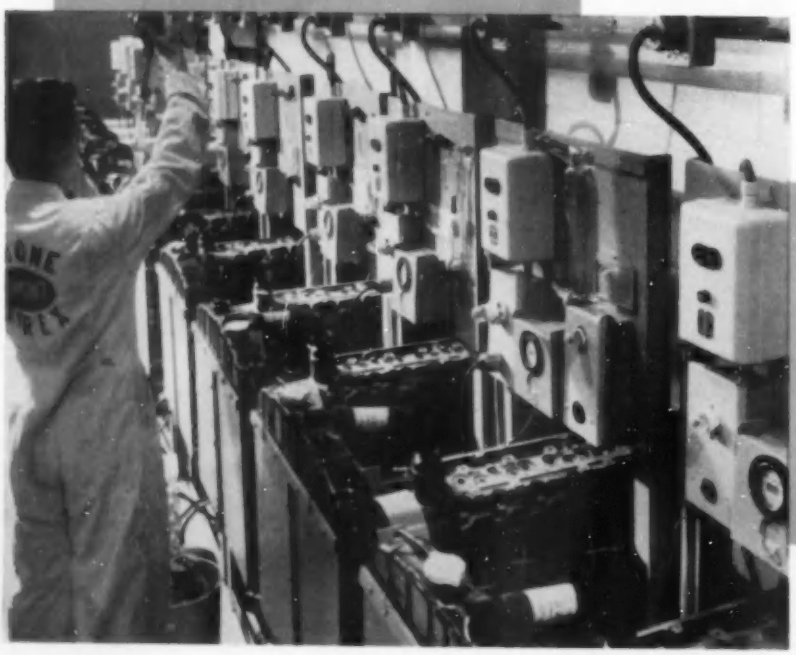
Special Equipment

installed at

DuPONT'S New Laboratory

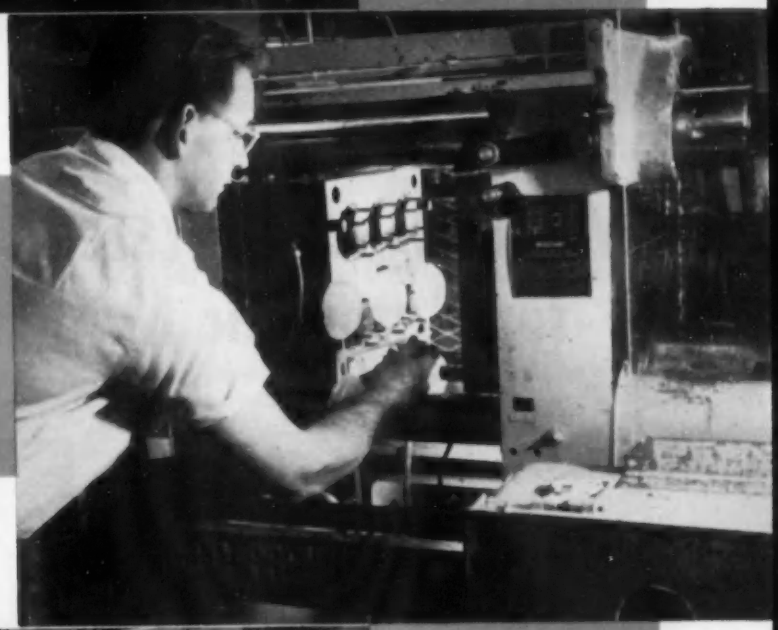
This Denison Multipress is used to preform or cold-form small parts such as "O" rings, seals, and bearings from Teflon molding powder. Almost 1000 pieces per hour can be cold formed in this hydraulic press.

THE Polychemicals Department of Du Pont recently opened a $3 million sales service laboratory at Chestnut Run, near Wilmington, Del. (see AI March 1). This new facility has a great deal of new equipment which is available to solve processing and design problems of plastics for assistance to Du Pont customers. Some of the equipment is pictured here together with a description of its function.



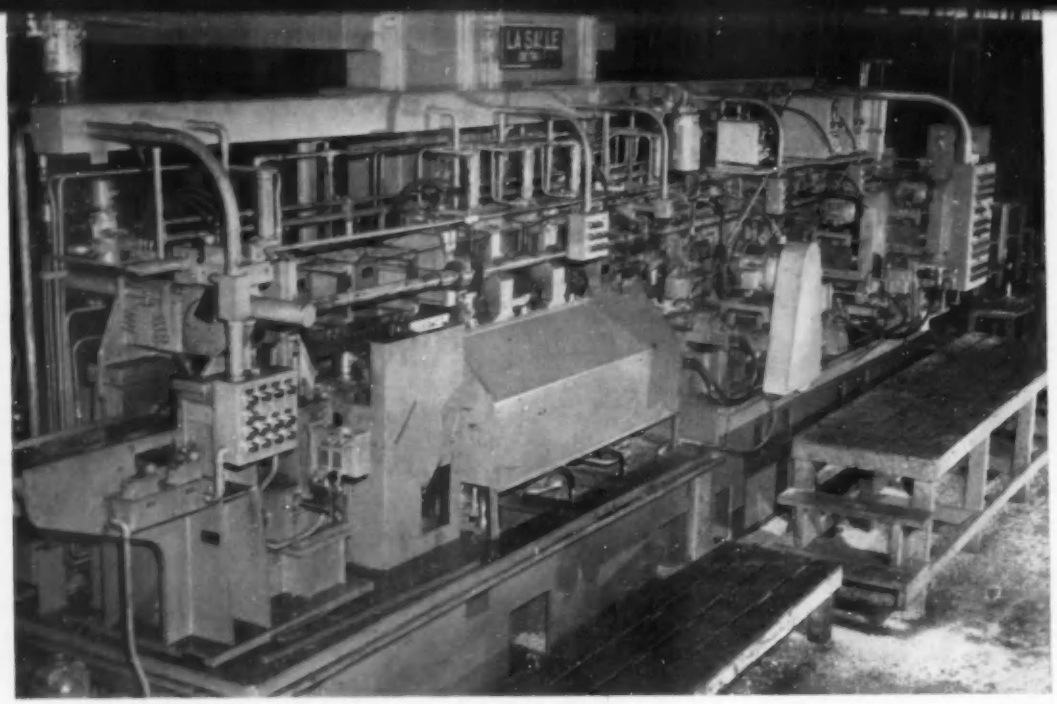
Twenty radiators and engine blocks are used to test a variety of coolants.

A high-speed steel router bit is used in conjunction with a tracer attachment to duplicate profiles in such materials as a block of Zytel nylon. Tests are made on machined parts *before* injection molds are built.



This Reed-Prentice injection molding machine is currently being used to make experimental Zytel nylon dome light lenses. Injection molding machines at the laboratory range in capacity from one ounce to 16 oz.

In the right background of this illustration can be seen a Fellows injection molding machine. This particular unit is molding a rotor of nylon. The materials handling unit in the foreground is one of the many types of such equipment used throughout the laboratory.



Perspective of first operation LaSalle transfer machine on piston line. This unit has a built-in chip conveyor to handle the large volume of aluminum chips.

NEW SETUP AT CHRYSLER for Automatic Machining of Pistons

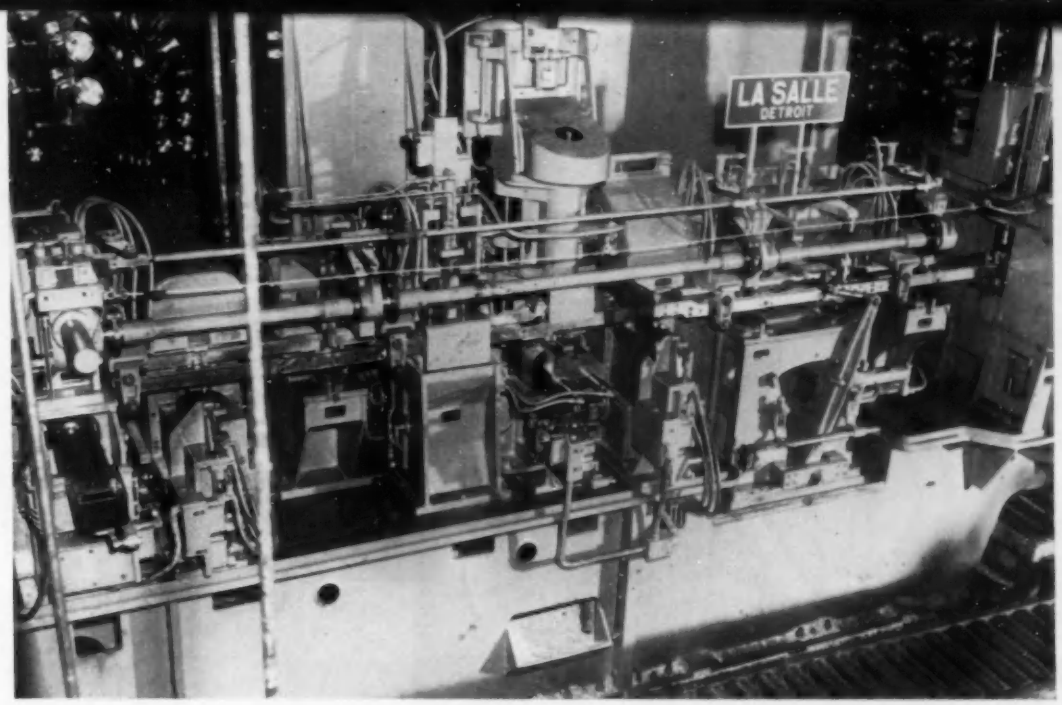
INCIDENT to the introduction of 1955 models, the Chrysler Division plant on East Jefferson Ave. in Detroit made some interesting changes in the piston machining line for the high volume Windsor V-8 engine. Outstanding in this respect is a Chrysler "first" — the installation of two special La Salle Tool transfer machines for handling a basic group of piston operations in extremely compact, fully automatic equipment.

First operation on the piston line takes place in a Hartford Special, eight-station trunnion indexing type machine, tooled to complete the following operations in a fully automatic cycle: center boss at head end, mill weight bosses, drill, chamfer, and taper-ream two locating holes in weight bosses. Besides being fully automatic in operation, this machine is fitted with automatic loading and unloading.

As pistons leave the Hartford machine, they are transported on a belt conveyor to a battery of Fay automatic lathes for rough- and semi-finish turning of piston ring grooves, facing and chamfering the skirt end, rough-facing and chamfering the head end, semi-finish-turning the OD, finish-turning ring land diameter and chamfering the ring grooves, finish-facing the head, and finish-turning the grooves.

Pistons now are ready for processing in the first of

Manual loading station of one of the LaSalle transfer machine units.



View of portion of second LaSalle machine—the automatic weighing unit. Both machines are quite similar in appearance. The shuttle type transfer mechanism may be seen directly above the fixtures, extending from the loading station at the extreme right.

two La Salle units, a 16-station transfer machine of unique design with hydraulic actuation and electronic controls. Transfer of work from station to station is handled by means of a shuttle type transfer bar, each position being fitted with a set of special nylon fingers for gripping the work without leaving clamp marks. The sequence of operations is as follows:

1. Load and position
2. Rough bore and chamfer piston pin holes both sides
3. Check piston pin hole both sides, with P & W Air-O-Limit gages. If either oversize or undersize, the gage automatically indicates the situation and stops the machine at the completion of the cycle
4. Idle
5. Undercut lock ring grooves both sides
6. P & W Air-O-Limit gages check the lock ring grooves
7. Idle
8. Saw two slots in oil ring groove
9. Idle
10. Mill first valve clearance in the head of piston
11. Remove center boss from head of piston
12. Mill second valve clearance in the head of piston
13. Idle
14. Idle
15. Wire brush valve clearances to remove burr
16. Unload

The next major operation is a setup in a three-way Model No. 233 index type Heald Bore-Matic, fitted with a two-station fixture, holding two pistons at a time. In the first position, the elliptical piston skirt is rough-, semi-, and finish-turned to finish size and form, using the rear head. At the second position, using the double-end head in front, the piston pin holes are semi- and finish-bored, each spindle completing one piston, holding the bore to a total tolerance of 0.0003 in. for size, out-of-roundness, and taper. This is done in a fully automatic cycle.

Final machining takes place in the second La Salle unit, a 10-station transfer machine essentially of the same type as the first unit. The sequence of operations in a fully automatic cycle is as follows:

1. Load and position
2. Idle
3. Idle
4. Idle
5. Weigh piston, record weight and preset the next station
6. Mill piston to weight
7. Blow out
8. Idle
9. Reweigh (check production 100%), segregate into: OK, plus, minus
10. Unload

According to Chrysler management, this machine is extremely sensitive and precise in its weighing function. Although the standard limit on weight is plus or minus two grams, it is actually holding weight to a tolerance of approximately one gram.

Grading according to weight is done at Station 9. Only perfect pistons are permitted to enter the unload station. Overweight pistons are rejected on a side track to the left; underweight to the right.

It is noteworthy that the adoption of the two La Salle units has served to compact the piston line, eliminating a number of individual machine operations. Besides increasing productivity, quality control has been improved materially by comparison with the former methods of processing.

T (3-ton) models in the new C-3 Series Dodge trucks are powered by a new 193-hp Power-Dome V-8 engine. Power steering and air brakes are available on this model. The T models have a gross vehicle weight rating of 22,500 lb.

Dodge Trucks for 1955

New Vehicles Range from ½-Ton Through Four Tons; Power Ratings Are from 103 to 202 Hp. Super Truck-O-Matic Three-Speed Automatic Transmission Introduced.

TRUCK RATINGS AND ENGINES FOR 1955

Nominal Rating	Models	Engine Displacement Cu In.	Gross Horse Power	Gross Torque
½	BL6	230.2	110	194
½	B6	230.2	110	194
½	B8	259.2	169	243
¾	CN6	230.2	110	194
¾	C6	230.2	110	194
¾	C8	259.2	169	243
1	DN6	230.2	110	194
1	D6	230.2	110	194
1	D8	259.2	169	243
1	PW6	230.2	103	191
1	DU6	230.2	103	191
1½	EU6	230.2	103	191
1½	FN6	230.2	110	194
1½	F6	230.2	110	194
1½	F8	259.2	169	243
1½	G6	250.6	120	210
1½	G8	259.2	169	243
2	H6	250.6	120	210
2	H8	259.2	169	243
2	HM6	250.6	112	205
2	HH6	265.37	125	225
2	HH8	259.2	169	243
2	HMM6	265.37	114	216
2½	J6	265.37	125	225
2½	J8	289.57	175	256
2½	JM6	265.37	114	216
2½	K6	265.37	136(1)	225(1)
2½	K8	289.57	175	256
2½	KMA6	265.37	114	216
2½	R8	331.1	193	303
3	T8	331.1	193	303
3½	V8	331.1	202(1)	316(1)
4	Y6	413.16	171(1)	343(1)
4	YX6	413.16	171(1)	343(1)

(1)—Twin carburetions.

1955 C-3 SERIES DODGE TRUCKS V-8 ENGINE SPECIFICATIONS

(OVERHEAD VALVE TYPE)

Truck Model	B-C-D-F	G-H*	J-K	R-T	V**
Bore (in.)	3.563	3.563	3.63	3.81	3.81
Stroke (in.)	3.25	3.25	3.256	3.625	3.63
Displacement (cu in.)	259.2	259.2	289.57	331.1	331.1
Compression Ratio	7.6 to 1	7.6 to 1	7.6 to 1	7.2 to 1	7.2 to 1
Bhp, net	134 @ 4400	134 @ 4400	142 @ 4400	174 @ 4000	187 @ 4000
Torque (lb ft) Gross (max.)	243 @ 2400	243 @ 2400	256 @ 2400	303 @ 2800	316 @ 2400
Net	218 @ 2000	218 @ 2000	230 @ 2400	286 @ 1800	309 @ 2400

* Engine has differences in features as described.

** Engine equipped with twin carburetors.

CHRYSLER'S "Forward Look" has been extended into its commercial vehicles as well, incident to the disclosure of the 1955 family of Dodge trucks. Offering a wide basic line of models, in a variety of types and body styles, and a wide range of wheelbases, Dodge blankets the field with vehicles ranging from ½-ton through 4-ton; with maximum GVW ratings from 4250 to 40,000 lb. At the same time the range of GCW ratings extends to a maximum of 60,000 lb.

The gamut of models encompasses conventional trucks and C-O-E's, including "Dual-Purpose" models; Route Vans; Power Wagons; school bus chassis; and Forward Control chassis. Included in this are three new town panel models—standard, deluxe, and Custom Regal.

Seven basic power plants, including new V-8 engines described later, provide a choice of 12 different power ratings, ranging from 103 to 202 hp. In the low-tonnage class—from ½- to 1-ton—Dodge offers an option of a 110-hp six-cylinder engine; or the 169-hp Power Dome V-8, the latter representing an increase of 24-hp over the V-8 available in '54.

A total of 22 stake or platform bodies in four lengths is available in models from ½- to 2½-ton.

Tubeless tires are now standard equipment on ½- and ¾-ton models.

In general, the '55 Dodge line provides greatly increased power and torque; entirely new styling features; a group of four new cabs with wraparound windshield and rear window, providing about 98 per cent circular vision; two types of automatic transmissions, and the expansion of power steering and power brakes into additional models, among other details to be described here.

From the standpoint of power plants, the same basic six-cylinder engines in production last year will be used in '55. In addition there are five Power Dome V-8's, stemming from three basic displacements, as outlined in the specifications table.

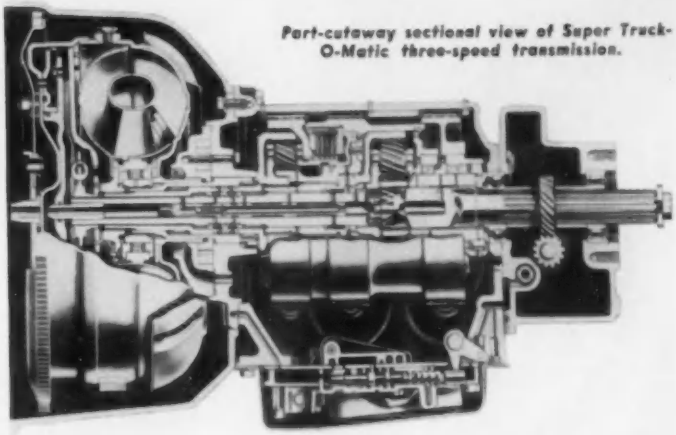
The V-8 engine for models B-C-D-F is of single rocker shaft design, features free-turning valves for both intake and exhaust, and valve guides integral with the head. Vacuum spark advance is employed.

The V-8 for models G and H is of the same basic displacement and output but has added heavy duty features. These include the following items: roller type timing chain, Tri-Metal connecting rod bearings, silicon-chrome exhaust valves, positive Roto-Cap exhaust valve rotators, free-turning intake valves. It has centrifugal distributor advance.

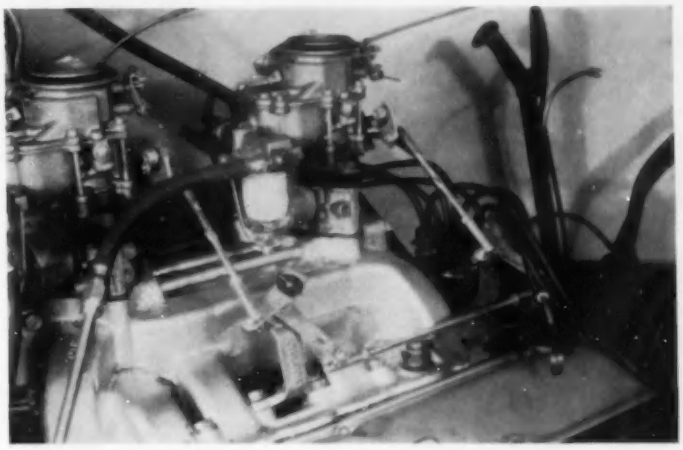
The V-8 for models J and K is of double-rocker shaft construction, embodying the following special features: induction hardened crankshaft journals; Tri-Metal bearings for main and connecting rods; improved silicon-chrome, sodium-cooled exhaust valves; hardenable iron exhaust valve guides; positive type Roto-Cap valve rotators for the exhaust valves; and exhaust valve seat inserts. Engine governor and oil filter are standard equipment.

Models R and T are equipped with 331.1 cu in., double-rocker shaft type V-8 engine having the following special features: gear driven camshaft; induction hardened crankshaft; Tri-Metal main and connecting rods bearings; silicon-chrome intake and exhaust valves; Stellite-faced, sodium-cooled exhaust

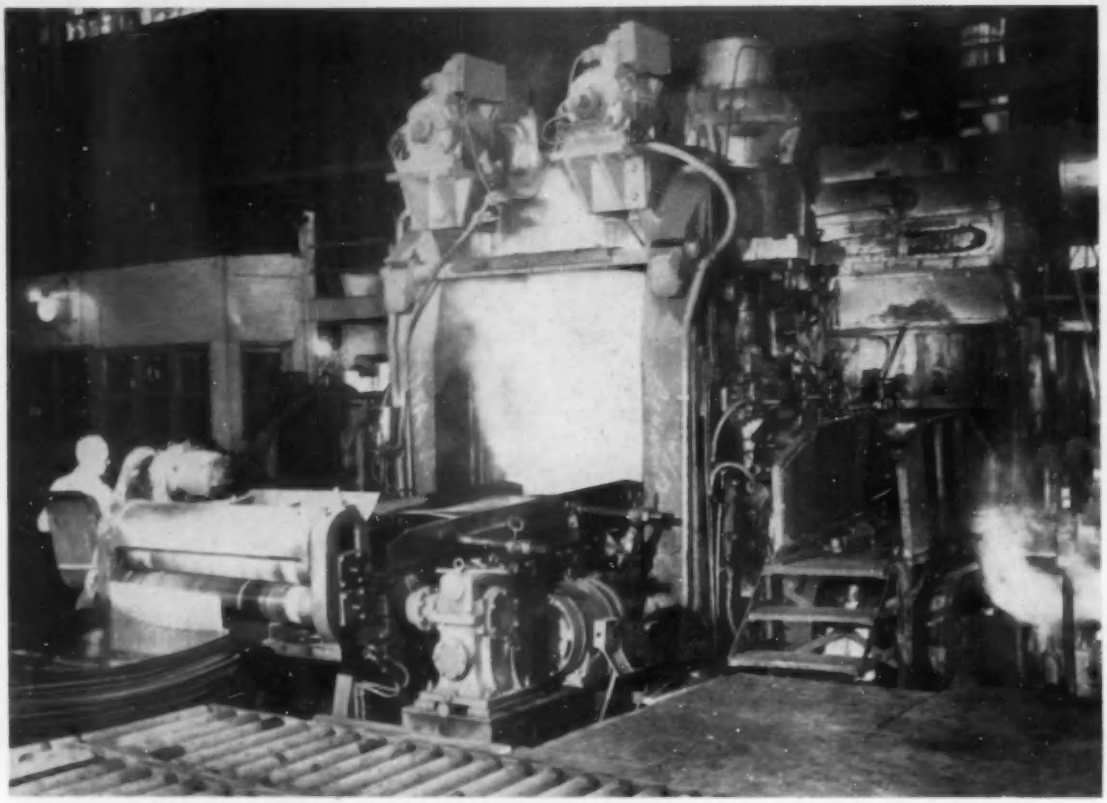
(*Turn to page* 113, *please*)



Part-cutaway sectional view of Super Truck-O-Matic three-speed transmission.



Left side view of twin carburetor throttle linkage.



Titanium rolling operation with a three-high mill reducing half inch sheet bar to ⅛ in. thick sheet

Advanced Production Methods and New Titanium Alloys Disclosed at Conference

By
Thomas MacNew

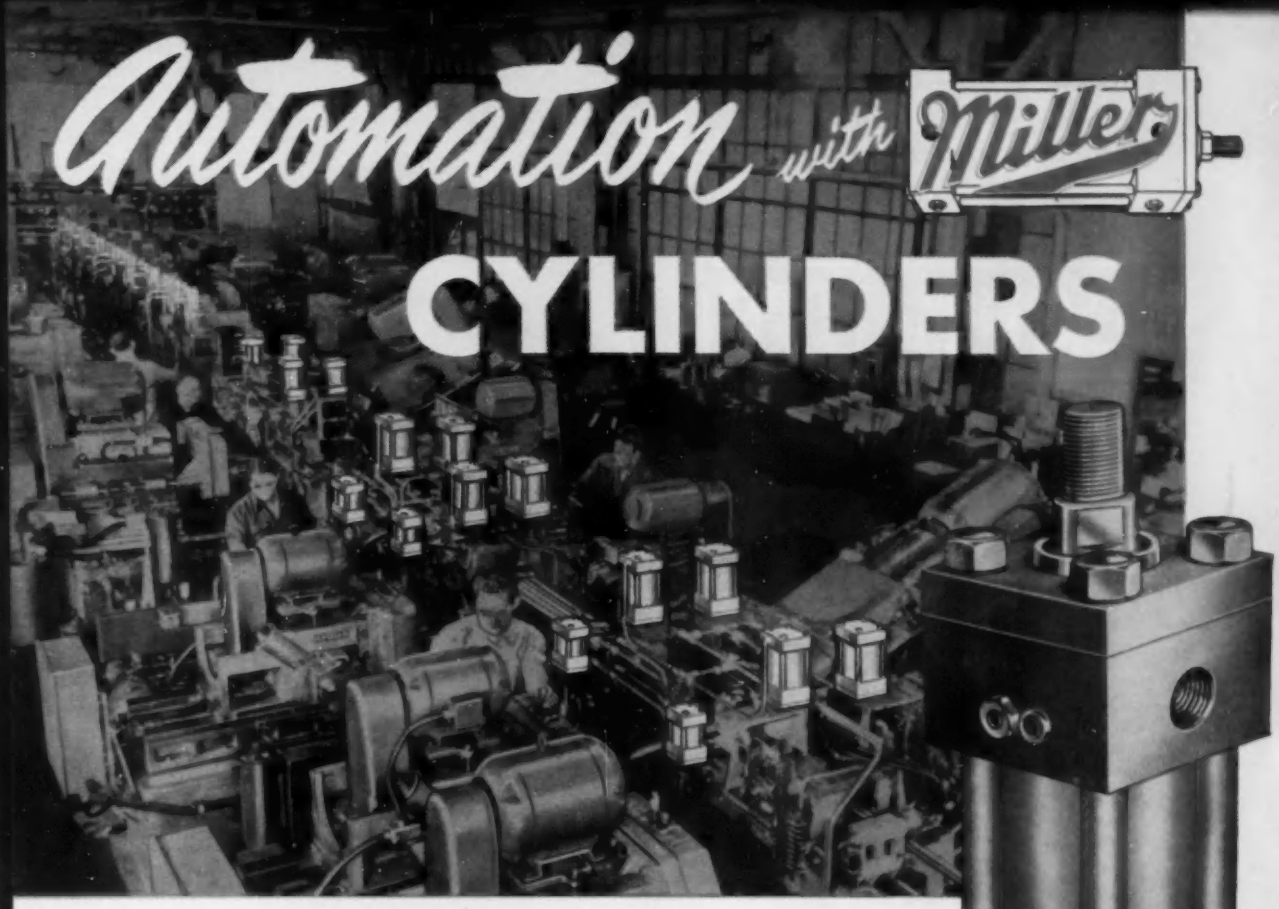
LAST month in Niles, Ohio, the Mallory-Sharon Titanium Corp. held a conference on the subject of titanium for board members of the corporation, top Government officials and members of the press. The meeting dealt primarily with the Mallory-Sharon titanium program, including production, research, development and testing procedures.

One of the highlights of the meeting was a trip through the Mallory-Sharon plant. The company has recently installed a 3000 ton HPM press which is utilized to compress sponge titanium into consumable electrodes prior to the melting operations. These electrodes are utilized in the plant's four new vacuum melting furnaces. This new melting shop, according to James A. Roemer, president, employs what is considered to be the most advanced method using a consumable electrode, melting twice and performing these operations in a vacuum. Called the Method "S" process, a homogeneous ingot and one which is said to be essentially gas free and of the highest quality is produced. The furnaces used for the process are enclosed in steel barriers as a personnel safety precaution. Each furnace is reached through vertical sliding doors. A bank of A. O. Smith 1000-w power units and General Electric germanium rectifiers are utilized for the power supplies. Remote control panels are used for the operation of the furnace equipment.

In addition to melting the titanium into ingots, Mallory-Sharon also performs the rolling operation. Titanium sheets are made in a variety of thicknesses, overall dimensions and qualities. Throughout the en-

(*Turn to page* 124, *please*)

Automation with Miller CYLINDERS



...assures non-stop production flow with BIG savings in maintenance and investment cost!

The production magic of "AUTOMATION" demands faultless performance—as the failure of one important component of "automation" machinery and equipment can shut down an entire manufacturing process.

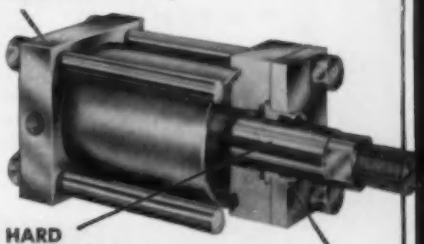
In the "automation" application illustrated above, 22 Standard Miller High Pressure Hydraulic Cylinders are employed on each of two identical automotive transfer machines built by Ex-Cell-O Corp. of Detroit, Michigan, a recognized leader in the design and manufacture of "automation" equipment.

The machines perform—simultaneously and automatically—drilling, countersinking, counterboring, and tapping operations on automotive cylinder heads. And the Miller Cylinders accomplish the vital clamping, feeding, holding, rotating and locating operations that enable the machines to function as smooth "automation" production units.

Miller Cylinders are ideal for such "automation" applications. They withstand severest shock loads, provide millions of smooth strokes without repacking of seals or other maintenance. Their space-saving square design cuts installation and designing costs. They're available in an infinite variety of versatile power and stroke units that cover every need and permit the most economical choice for the application. And they fully meet the J.I.C. Standards.

Consult our engineering department or local representative. And write for complete information on this and other interesting applications and for our FREE Cylinder Bulletins A-105 and H-104.

SOLID STEEL HEADS, CAPS and MOUNTINGS
Eliminate Breakage



HARD CHROME PLATED PISTON RODS
Prevent Scratch-Damage, Nicks and Rust

DIRT WIPER SEALS
Protect Rods, Seals, Bushings

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AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

This "editorialized message" was written after learning the results of an extensive survey recently made by another organization.

LAPOINTE the name that is known in BROACHING

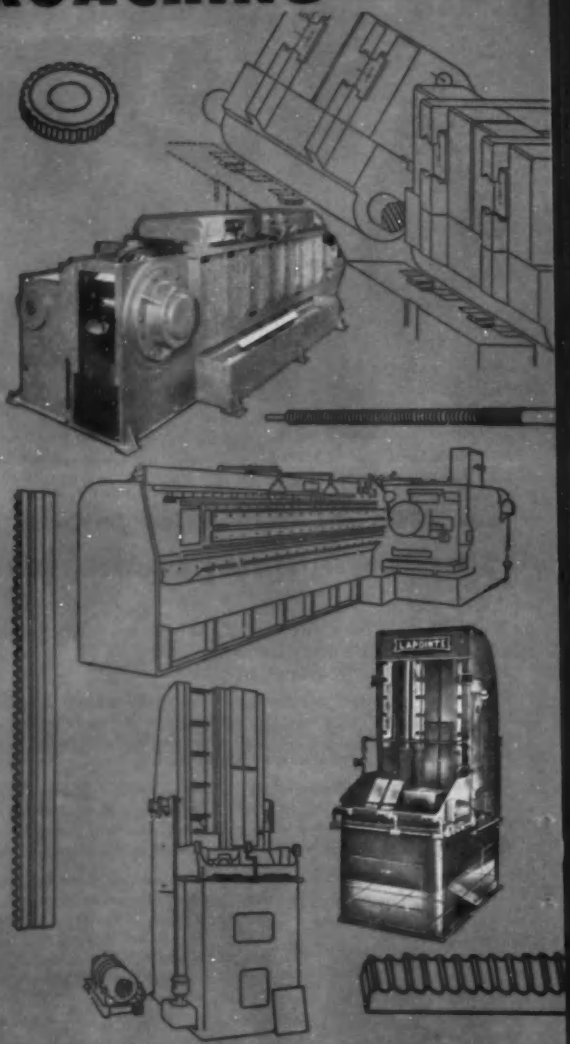
In any industry, there's always one manufacturer's name that stands out — that comes to mind *first* when you think about that industry. You know this is true. You can think of several, right now, without half trying.

In the field of broaching, men for a great many years have put Lapointe at the top of the list in this matter of name recognition. That may be caused partly by Lapointe's age, for Lapointe did indeed pioneer the development of broaching 53 years ago. Or it may be caused partly by Lapointe's size, for Lapointe several times has been forced to substantially increase its plant, this physical growth placing Lapointe always in the "number one" spot as the world's largest manufacturer of broaching machines and broaches.

But age and size alone do not necessarily constitute leadership, or assure that yours will be the name that is known. Here at Lapointe we like to think that it comes from the capable, loyal organization that has been built up through these many years of making broaching equipment exclusively. Our engineers and our plant personnel live in the atmosphere of broaching. And this activity embraces the entire broaching process — including not only the machines and tools but also the designing and building of the all-important fixtures that so often make the difference between success or failure in a particular broaching application.

It is this engineering experience, this ingrained and intuitive "broaching sensitivity", that keeps Lapointe at the top of the list.

We realize that no amount of advertising could accomplish that result. No, it's the quiet recognition and acceptance by important men in industry who *know broaching*, that makes Lapointe "the name that is known." We are grateful for this, and we intend to keep it that way.

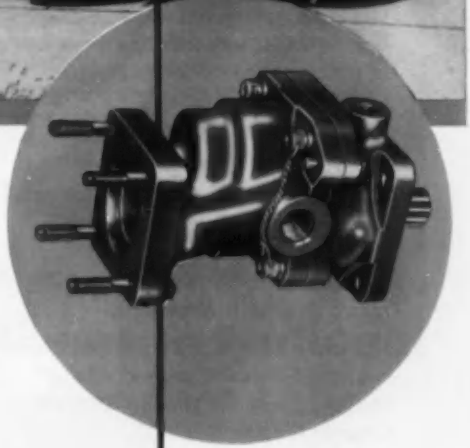


THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
In England: Watford, Hertfordshire

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

Why the first gas turbine bus uses a Pesco fuel pump

Gas turbine transit bus, first of its kind, uses a 325-horsepower single burner turbine instead of the conventional diesel engine. Power plant engineers solved problem of fuel pump performance and service life with Pesco unit.



Are you developing or producing gas turbine engines for automotive, marine, aircraft or industrial applications? Then it will be of essential interest to know why the world's first gas turbine bus uses a Pesco High Pressure Fuel Pump.

On this radical new bus, the Pesco pump provides a continuous and dependable flow of fuel over an extended service life. It operates at sustained high volumetric efficiencies in spite of (1) the relatively high fuel system pressures encountered with gas turbine engines and (2) the inherent lack of lubricating value of the fuel.

The reason for such superior performance is the exclusive Pesco principle of pump design—"Pressure Loaded" bearings. This feature maintains continued new pump performance by automatically compensating for wear. It also assures constant pumping characteristics regardless of changes in temperature, viscosity or load.

Pesco, foremost producer of fuel pumps for aircraft jet engines, can supply fuel pumps for any type or size of gas turbine equipment. We will be pleased to work with you in developing a fuel pump to meet your specific requirements. Why not call in a Pesco sales engineer today. Contact: PESCO, 24700 North Miles Road, Bedford, Ohio.

Model 022816 High Pressure Fuel Pump, being used experimentally on gas turbine bus, is an engine-driven, gear-type unit. Compact in design and weighing only 3½ pounds, it is rated at 2.3 gpm at 3000 RPM at 650 psi.

engineering Pesco production

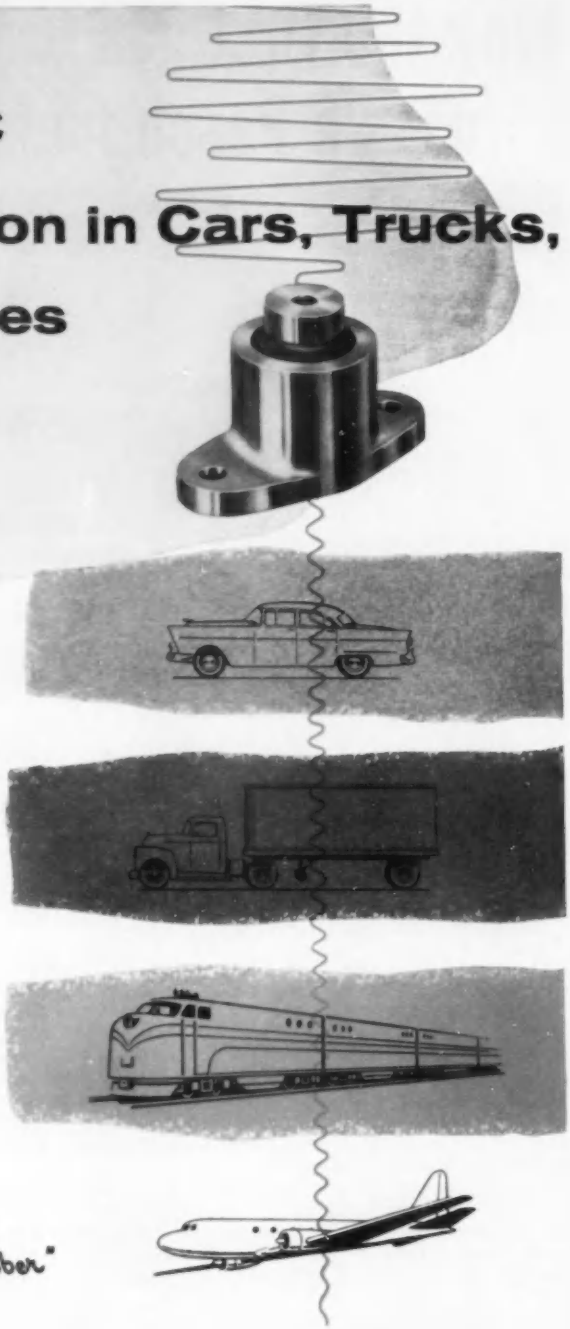
PRODUCTS DIVISION

BORG-WARNER CORPORATION

24700 NORTH MILES ROAD • BEDFORD, OHIO

SILENTBLOC

Squelches Vibration in Cars, Trucks, Trains and Planes



Silentbloc mounts and bearings throttle vibration, noise, and shock . . . have been doing it successfully for years in planes, cars, trucks and trains. In fact, wherever there's motion there is probable application for unique rubber-in-metal Silentbloc units.

There is no job too big or too small for Silentbloc. Units are available to handle loads from delicate instruments to machinery weighing many thousands of pounds.

For a complete selection and design guide to Silentbloc motion control products write for Catalog 4240. The General Tire & Rubber Company, Industrial Products Division, Dept. D, Wabash, Indiana.

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THE GENERAL TIRE *Industrial Products Division*
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Silentbloc vibration and shock mountings • Silentbloc bushings • Silentbloc bearings • Oil & hydraulic seals • Bonded to metal rubber parts • Hydraulic brake parts • Metal stampings • Extruded & molded rubber • Extruded plastic • Polyester glass laminates • Sponge rubber • Glass run channel • Vibrex® fasteners.

Welding eliminated HERE

Welding operation required in two-piece construction was eliminated by cold heading bolt in one piece.

Roll threading permitted faster production at lower cost.

A manufacturer of power lawn mowers uses a bent eyebolt as a mounting brace to adjust the cutting height of the mower blades. The bolt was formerly produced by welding an eye forging to a bolt made on a screw machine . . . and then bending into the shape needed. National was asked how this bolt could be produced faster and at lower cost.

National's "Special Products Service" came up with a method of producing the bolt in one piece by cold heading and roll threading. In this way, the welding operation was eliminated and the manufacturer realized a lower unit cost. Thanks to National's wide range of cold heading equipment and specialized know-how . . . the same type of economy can be offered you.

Bring your "Special" problems to National

Do you have a fastener or a small part problem that can be solved by National's "Special Products Service"? Our representative will be glad to discuss your needs. Write for free copy of National's "Special" fastener booklet.

REPRESENTATIVES IN:

Chicago	Kansas City, Mo.	Philadelphia
Cincinnati	Lansing	Rochester
Denver	Milwaukee	San Francisco
Detroit	Minneapolis	Seattle
Indianapolis	New York	St. Louis

THE NATIONAL SCREW & MFG. COMPANY

Cleveland 4, Ohio

Pacific Coast: National Screw & Mfg. Co. of Cal.
3423 South Garfield Ave., Los Angeles 22, Cal.

National PRODUCTS

Fasteners  Hodell Chains  Chester Hoists 

Why continue to waste press lubrication dollars through lack of Farval?

FARVAL—
Studies in Centralized Lubrication No. 161

ANY pressroom foreman will tell you that lubricating *even one* press by hand is costly. Costly in time, production lost, bearing repairs and lubricant wasted!

On the other hand, hundreds of foremen will tell you that Farval can save all this needless expense—*immediately* upon installation. That's because FARVAL, the Dualine system of centralized lubrication, delivers oil or grease, in exact measure simultaneously to every individual bearing as often as desired and while a machine is operating.

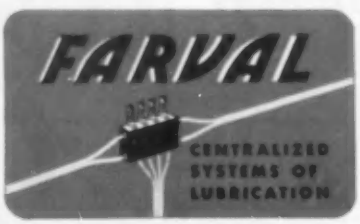
Farval saves $66,000

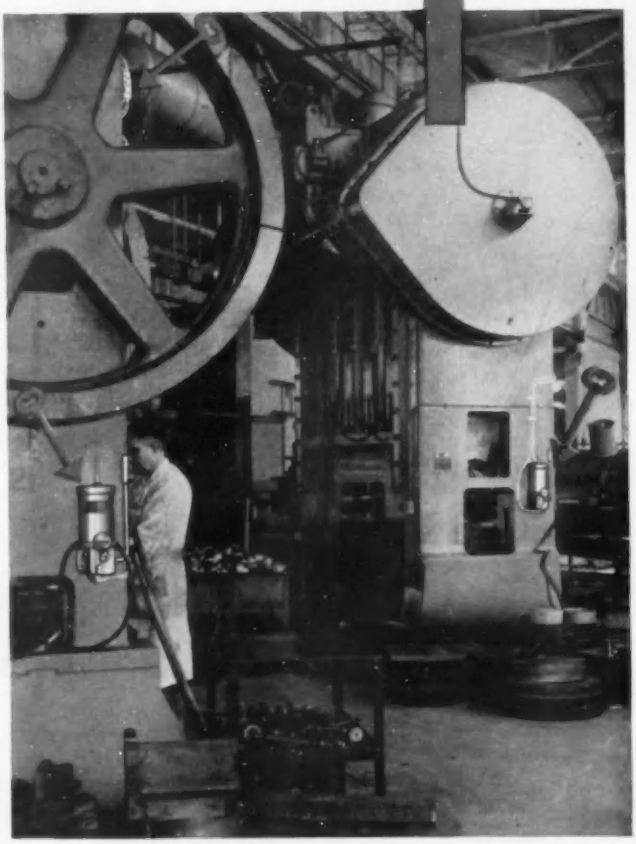
For example, Whiteway Stamping Company, Euclid, Ohio, first installed one Farval system on a press in 1928. Result? An end to press shutdowns for lubrication! Several hours of expensive oiling labor saved each day! Nine other large presses were *Farvalized*. So well has Farval worked that in 26 years not a single bearing has been lost for lack of proper lubrication. Today, the owner estimates that in the quarter century that Farval has been in operation, he has saved at least $66,000 in oiling labor alone, not to count thousands of hours of production time. Yet, *total* Farval investment was only $1,087 per press!

Free Lubrication Survey

So, why not let us send one of our lubrication engineers to inspect *your* plant equipment? Without obligation, he will present a *confidential* written analysis of what Farval can do for you. The savings will surprise you! The Farval Corporation, 3296 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.





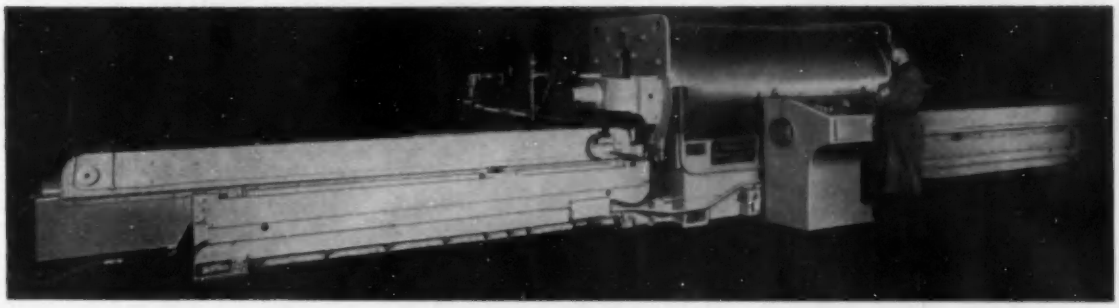
KEYS TO ADEQUATE LUBRICATION—Wherever you see the sign of Farval—the familiar valve manifolds, dual lubricant lines and central pumping station—you know a machine is being properly lubricated. Farval manually operated and automatic systems protect millions of industrial bearings.

Photo shows two of the ten presses at Whiteway Stamping Company, with a Farval manual pumping station conveniently installed on each.

News of the MACHINERY INDUSTRIES

By Thomas Mac New

Orders for New Machine Tools Reached a New 17-month High During February. Backlog Now More than Four Months



Hydraulic Press Manufacturing Co., Mt. Gilead, Ohio, has brought out two models of a line of high pressure metal forming presses. These presses, like the one shown, will be used for the Guerin process. The equipment has a capacity of 10,800 tons for one model and 19,500 for the other. Called the Diaform, the press features a flat table top which is raised into the pressure retainer during the forming cycle.

¾ Billion Possible For Tool Builders

The machine tool builders enjoyed an excellent rate of new orders during February. According to the National Machine Tool Builders Association, orders for the month were 31 per cent higher than for February, 1954. Actually, a 17-month high was reached during February with over $62 million reported. Because of the high order rate and the fact that shipments remained approximately equal to those of January, the industry's backlog increased to slightly over four months. Since military expenditures have not yet played a major role in new tool sales, the machine tools being ordered are primarily for the civilian market. If this trend continues, the machine tool builders will enjoy an excellent year in 1955. Another factor which will no doubt produce many new orders is the forthcoming machine tool show in September.

Sundstrand Installs New Lathe

One of the first installations of heavy duty Sundstrand automatic lathes with tracer control was made recently at Fairfield Mfg. Co., Lafayette, Ind., manufacturer of automotive gears. These lathes have great versatility in machining long shafts in small lots, using suitable templates. One of the parts scheduled over this equipment is a long shaft with a drive pinion at one end for a tractor main drive. Cutting is done at the rate of 600 sfpm with feed of 0.018 ipr. Floor to floor time, starting with rough forging, is 3 minutes.

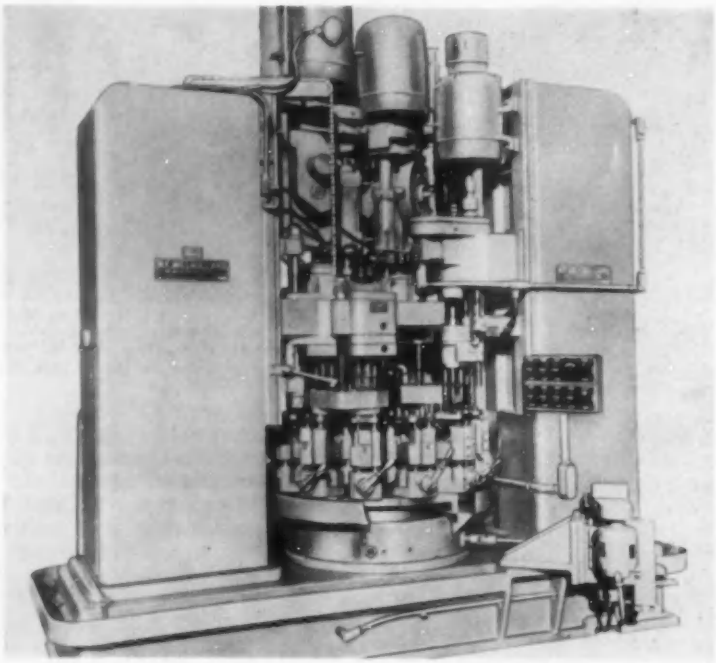
Fairfield devotes considerable attention to equipment modernization, and recently installed two units of the largest chucking type automatic turret lathes made by Warner & Swasey; and one of the largest models of Potter & Johnston turret lathes available today.

(*Turn to page* 104, *please*)

Installation of the Sundstrand heavy duty automatic lathe at Fairfield.

NEW EQUIPMENT PLANT • PRODUCTION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89



Chips are moved by wiper blades in a ring on the index tables to a removable pan.

Twelve-Station Vertical Indexing Machine

A SPECIAL machine recently built features a compact fixture setup. Parts are located on a self-centering horizontal Vee and held with an up-acting clamp. A single handle controls clamping. Register pins are provided for the bushing plates. The 12 fixtures rotate on an automatic index table. Two of the maker's No. 5, 10-hp automatic units are mounted vertically, one with 22 spindles for drilling, reaming, and counterbalancing, and one with five spindles for boring. A No. 2, ¾-hp unit is mounted horizontally on a rapid travel slide. An automatic lead screw tapper powered with a five-hp reversible motor drives a six-spindle head. Production is 93 parts per hour at 80 per cent efficiency.

The automatic units are said to cut metal 80 per cent of the cycle time. They feature a unique plate type cam and hydraulic counterbalance. All controls are built to JIC standards. *W. K. Millholland Machinery Co., Inc.*

Circle 56 on postcard for more data

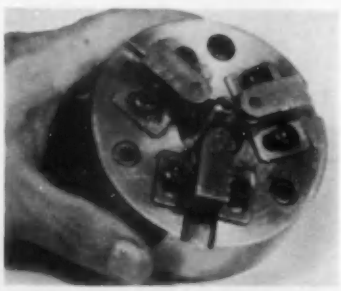
Deburring Head

A ROLL-FORMING process is used to debur the inside and outside diameter of the ends of ferrous and non-ferrous metal tubing. The deburring head can be mounted on the spindles of a wide variety of standard and special single and double end tube burring machines.

Problems often encountered with chips removed by conventional machining deburring operations are completely avoided by this new roll-forming concept. The deburred surface formed by the tool is smooth and concentric with the inside diameter of the tubing.

Called the Rol-Bur head, the 3¾-in. diameter tool includes three rollers and interchangeable mandrels. The rollers are adjustably mounted to permit the deburring of tubing from ¼ to 1¼-in. outside diameter.

Each of the three rollers has a tapered form which provides the reducing action that rolls down both inside and outside diameter burrs as the head is fed into depth over the tubing. Rollers are ground, through-hardened steel and are supported by sleeve bearings. The ground, hardened-steel bullet-nosed mandrel screws into the cold rolled steel head.



Tubco's Rol-Bur Head

Mounting of the tool on the spindle of the burring machine is provided by an adapter plate. In operation, the head is advanced and the mandrel enters the end of the tubing. The mandrel provides tube support and also corrects any tube deformation from previous cutoff operations.

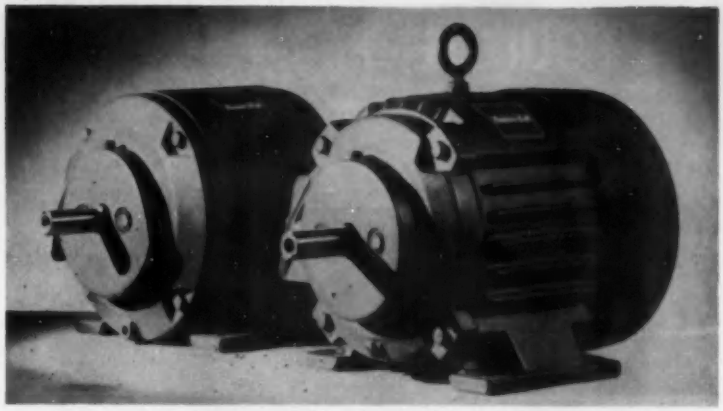
When the end of the tubing contacts the angular roller surface, only a light pressure is required to roll-form the burrs from both the ID and OD of the tubing. From 1/32 to 1/16-in. feed into the rollers is adequate to remove burrs from all tubing within the capacity of the head. *Tubco Co.*

Circle 57 on postcard for more data

"Totally-Protected" Motors Unveiled

TOTAL protection is built into a new line of a-c motors just announced, from solid-cast frames to the plastic sleeving that protects brazed coil head connections.

Regardless of mounting positions, the totally-protected motor offers maximum protection against drip, splash, and falling objects. Ventilation louvers are positioned high in the end brackets. The frame extends beyond the coil heads to give full protection to the windings, an important feature when end brackets are removed. Compact, rugged brackets ensure shockproof shaft support by placing the bearing mountings closer to the frame. New neoprene gaskets afford a positive seal between the frame and conduit box, and these gaskets have indexed "pressure knobs" to securely hold each lead. Conduit boxes can be positioned in any of the four quadrants for ease of installation.



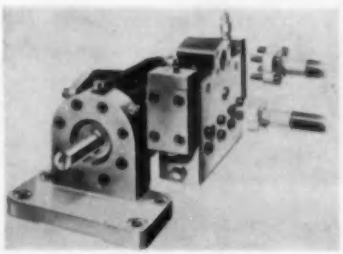
Reliance protected a-c motor (left) and enclosed fan-cooled a-c motor (right).

In three categories of this enclosed group are the fan-cooled, corrosion-proof, and explosion-proof design. They offer such features as corrosion-proof outer fans and cast iron conduit boxes on the fan-cooled, neoprene shaft slingers and optional stainless steel components on the corrosion-proof, and brass shaft slingers affording five-direction labyrinth fits on the explosion-proof motor. *Reliance Electric & Engineering Co.*

Circle 58 on postcard for more data

Double Pump

A SERIES of 2000-psi variable delivery hydraulic power units is now offered as double pumps equipped with integral valve panels on the discharge ports. Comprising two standard PF-100 dual vane interchangeable pumping cartridges, with common drive shaft and common inlet but discharging through separate outlets, the new integral units may be used to supply power to two separate systems or to a single two-pressure circuit. They are especially adapted to the operation of circuits calling for substantial variation in pump volume such as hydraulic presses, diecasting and plastic molding machines, closing and clamping devices and machine tools.

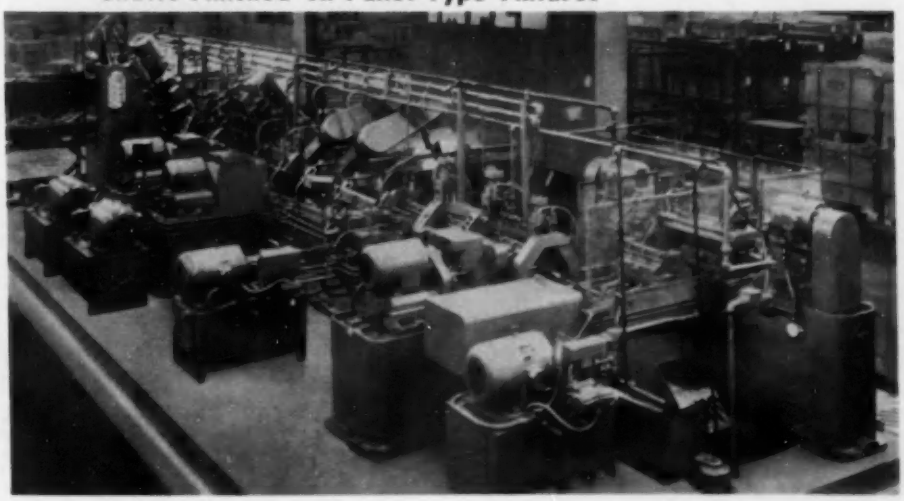


Dudco double pump

The pumping cartridges have capacities of 3, 5, 8 and 11 gpm, rated at 1200 rpm. Total pump capacity ranges from six to 22 gpm, depending upon the combination of cartridges selected. The cartridges (or the cam rings only, if desired) are interchangeable to permit up to 10 quick changes of capacity if the power requirements of the system change. *Dudco Div., New York Air Brake Co.*

Circle 59 on postcard for more data

Shafts Finished on Pallet-Type Fixtures



This transfer machine mills, drills, reams and checks rocker arm shafts. Ten-second machine cycle produces 360 parts per hour gross. Parts are automatically positioned endwise and power clamped. Transfer system is hydraulic. Features include automatic lubrication, chip conveyor and pallet wash. Industrial Metal Products Corp.)

Circle 60 on postcard for more data

NEW EQUIPMENT PLANT • PRODUCTION

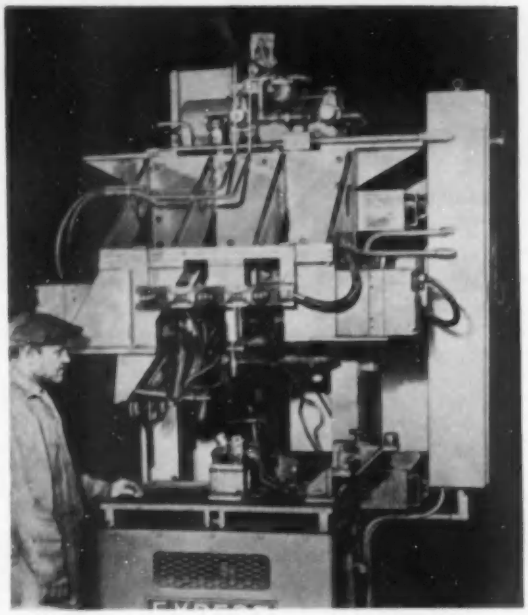
Line of Welding Presses

THREE sizes of two-ton inverted mechanical presses have been designed for spot and projection resistance welding. The 32, 42 and 60-in. models each have 27-in. deep platens and have adjustable strokes of five, six, and eight in. The large drilled and tapped platen areas permit quick changing of electrode and fixture or die setups. Maximum speed is 2200 strokes per hour.

A mechanical drive unit or knee raises the lower platen through a double Scotch yoke mechanism. The drive motor and flywheel runs at constant speed. Air cylinders counterbalance a one-ton load on the platen; a surge tank and closed air circuit keeps air requirements to a minimum. The knee can be easily removed to change the shut height.

When the operator simultaneously depresses interlocked cycle start buttons with each hand, the brake in the mechanical knee is released and the platen rises to top dead center where the brake is again applied. Then a limit switch is tripped, and the welding guns are brought in. The weld timer times out through a squeeze, weld and hold cycle, the guns retract, and the platen returns to bottom dead center. Then the finish-welded part is removed, and the fixture reloaded. *Expert Welding Machine Div.*

Circle 61 on postcard for more data

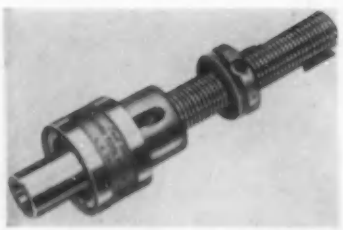


Electrical controls for the mechanical presses are in a panel enclosure on either side of the C-frame. Electronic controls are in a cabinet on the other side of the frame. Welding gun air controls are mounted on top of the C-frame. This unit is tooled to spot weld supports in a gasoline tank.

Adapter Shank

ADJUSTABLE adapter shank Toolflex tool holders can be furnished with Morse taper sleeve, straight bore or tap collets. They are designed for close center applications and can operate as close as 7/8in. centers. Only four main parts are used. A Neoprene insert provides universal float that corrects for both parallel and angular misalignment, preventing bell mouthing and oversized holes or torn and oversized threads. *Barg Tool Manufacturing Co.*

Circle 62 on postcard for more data



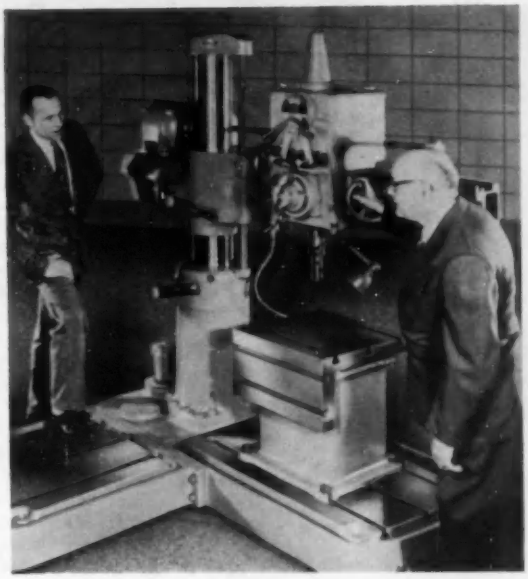
Toolflex adapter shank tool holder for close centers.

Single-Purpose Machine Drills Carburetor Bodies

An eight-station transfer machine handles 450 carburetor bodies per hour gross. Parts are dual loaded and ride free on rails between stations propelled by an air-hydraulic mechanism. They are located and clamped in machined valve holes. There are five drill units and two tapping units. (Hartford Special Machinery Co.)

Circle 63 on postcard for more data

Drill With Hardened Column



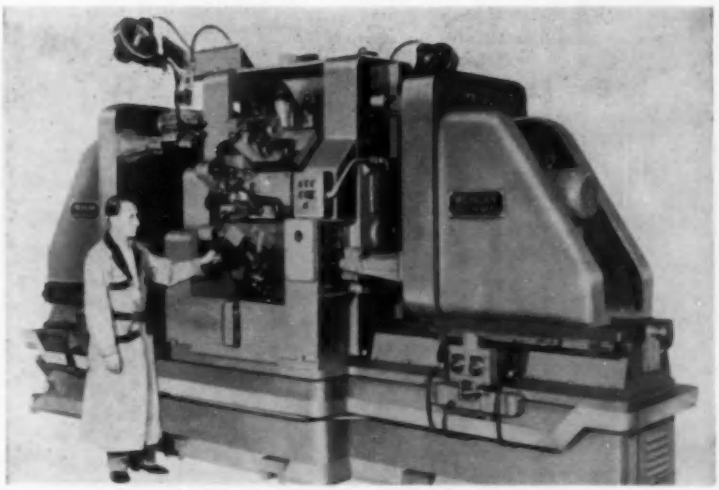
A flame-hardened column to prevent scoring provides the Hardclad radial drill with sustained accuracy. The column is a thick-walled centrifugal casting turned, hardened and finish ground. Simplified two-lever controls are easy to reach. Nine spindle speeds and six power feeds are provided. Anti-friction bearings are used on speed and feed shafts. Capacity is 1½ in. in cast iron; three-ft arm drills to center of 77-in. circle. (Cincinnati Lathe and Tool Co.)

Circle 64 on postcard for more data

Combines Drilling With Assembling

BUSHINGS and pins are seated in an automatic drilling machine tooled for exhaust manifolds. The trunnion type index table double end machine drills and reams two holes for the heat control butterfly; drills the stop pin hole; feeds, presses and stakes two bushings; reams the bushings; feeds and presses the pin in place. The machine produces 120 manifolds per hour. Vickers hydraulic components follow JIC standards. *Michigan Drill Head Co.*

Circle 65 on postcard for more data



Center section of this automatic trunnion type machine is accessible for retooling.

Valve-Cylinders

MODELS SVA and SVE cylinders feature integral valves in the rear head and are available in two and three-in. bores, any length of stroke up to 60 in. and with or without adjustable cushions.

The cylinders have ground and polished stainless steel rods, honed brass tubes and Nylined bearings. The built-in valves are of the slider type, actuated by a spool whose instantaneous motion is achieved by momentarily bleeding air from one end or the other.

On model SVE the actuation of the cylinder is accomplished through two solenoids available for either 110-v or eght-v operation. On model SVA, the actuation is achieved through two bleeder valves.

Model SVE electrically controlled air cylinder

The valves feature large ports throughout for fast actuation and two-built-in speed controls. The solenoid coils are completely molded in an epoxy resin and impervious to the most intense moisture conditions. A choice of foot mounts, flange mounts, swivel brackets and rod clevis is available for mounting cylinders in any position. *A. K. Allen Co.*

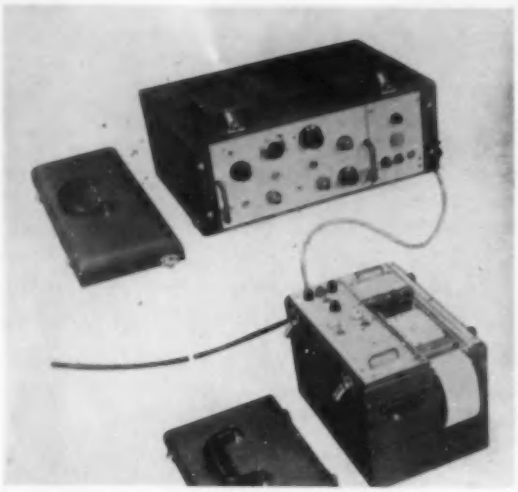
Circle 66 on postcard for more data

Blueprint Stand

This all-metal six-ft blueprint reading stand also can be wall-hung. The 24 by 40½-in. easel swings 360 deg, tilts 25 deg. Blueprints are secured by six magnetized blocks. (Young Radiator Co.)

Circle 67 on postcard for more data

NEW EQUIPMENT — PLANT · PRODUCTION



Portable Sanborn single-channel oscillograph Series 150

One-Channel Oscillograph

PLUG-IN preamplifiers permit simple changeover from one type of recording to another in the 150 Series single-channel oscillograph system. Seven "150" preamplifiers are available: ac-dc, carrier, servo monitor, dc coupling, log-audio, low level, and input coupling. They plug into a driver amplifier-power supply unit model 150-200/400, housed in a carrying case. A simple patch cord connection couples the amplifier to a separately housed recorder model 151-100A.

System features include inkless recording in true rectangular coordinates, at paper travel speeds of 5, 10, 25, 50 and 100 mm/sec.; an extra stylus for time marking or coding (manual or remote) along chart edge; provision for making notations on chart during recording. The chart is clearly visible during recording and paper is loaded from the top. Both units of the system are compact, lightweight and portable. *Sanborn Co., Industrial Div.*

Circle 68 on postcard for more data

Record Maker

MONITORING the operation of up to 30 machines simultaneously, giving an instantaneous and permanent record of their operation, cycle, and down time, is the function of a recorder now available. An Electrosensitive paper, which uses electricity as the ink, makes it possible to pass current from a styli through the paper and make a mark. Current to activate styli is picked up by switches mounted on machines or equipment where a record of activity is needed. Two models are available, with speeds of one and six in. of tape per minute, or one and 12 ipm. *Alden Electric & Impulse Recording Equipment Co.*

Circle 69 on postcard for more data

Interpretative remarks may be written on the record of the Alden recorder.

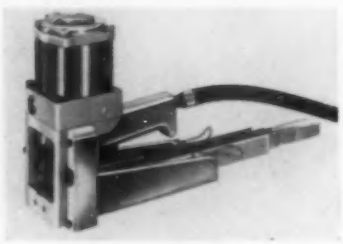
Bar Feeder

Model 17008 bar feeder will handle bars and tubes ¼ to 1½ in. in diameter and six to 26 in. long. Any constant speed of five to 20 ipm from hopper to the machine can be set. Cycling can be either photo-electric relay or mercury switch. (Feedall, Inc.)

Circle 70 on postcard for more data

Portable Stapler

AN air operated portable stapler model AB-1 replaces the firm's former pneumatic stapler model HPA. A two-cycle air motor has permitted a reduction in the weight to only 8¾ lbs, about one third that of the previous model. The new motor also eliminates the need for a return cycle air valve and prevents the machine-gun effect of continuous cycling.



Air operated stapler

The retractable anvil stapling head has two pivoting anvils that penetrate the carton to provide a clinching base for the entering staple. Adjustable penetration control of both anvil and staple is said to prevent any possible damage to fragile contents. *International Staple and Machine Co.*

Circle 71 on postcard for more data

Checks Sulfur in Petroleum

FAST combustion of heavy and light hydrocarbons is now possible with the LI-500P H-F combustion unit. The induction furnace itself, prior to being modified for combustion of petroleum samples, was used extensively for sulfur and carbon determination in the ferrous industry.

Fifteen to twenty minutes are required for one complete analysis, from initial weighing to final computation. Once the weighed sample is placed in the induction field, the operator devotes his entire attention to titrating (iodometric method). The titration assembly consists primarily of an absorption cell covered in ASTM specifications on the lamp sulfur method. In the titration itself, the combusted gases are passed through an acid solution of starch, potassium iodide, and several drops of potassium iodate. At the end of the burning period, the intensity of the blue color is adjusted to that at the start of the test. The amount of standard iodate solution added is a measure of the sulfur content of the sample. The sample is placed in a ceramic container to withstand the thermal shock. The furnace generates temperatures in excess of 3000 F. *Lindberg Engineering Co., Laboratory Div.*

Circle 72 on postcard for more data

Enclosed Motor

AN improved motor of the completely enclosed type and which meets the new NEMA standards is now in production. Type J features greater protection through improved types of enclosure, precision fits, closer tolerances in machining, and structural refinements. Exposed surfaces and the frame are cast iron. The stator core is pre-wound and asbestos protected. The rotor is electronically balanced. Other features include an improved slinger seal and a cast split-dome conduit box which can be rotated to any of four positions. The fan type is being produced in ratings from one to 10 hp. *U. S. Electrical Motors, Inc.*

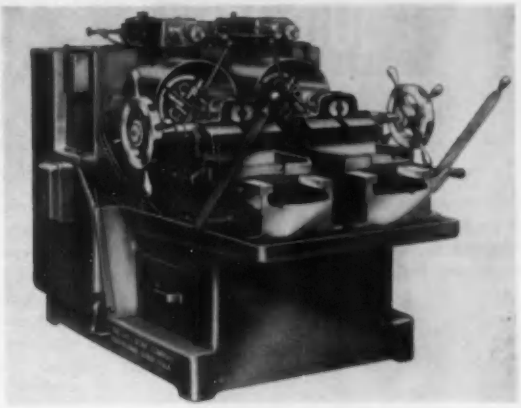
Circle 73 on postcard for more data

LP-Gas Kits

FORK truck users can convert their gasoline powered engines to burn liquefied petroleum gas. The UL-approved parts can be used on the maker's standard Clipper, Carloader, Yardlift 40 and Utilitruc model fork trucks. *Clark Equipment Co.*

Circle 74 on postcard for more data

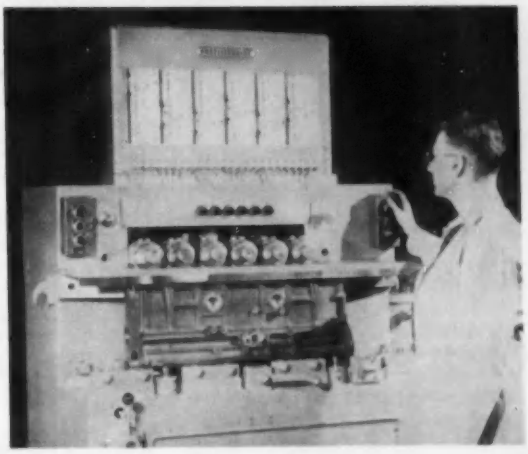
Heavy Threading Machine



Model XLA heavy duty threading machines in one or two-spindle designs, come in 1, 1½, 2 and 2½-in. capacity sizes. Spindles are hollow for long threading, and each has its own motor. Coolant flow is automatic, and starting, stopping, jogging and direction of rotation are controlled by pushbuttons. (Hill Acme Co.)

Circle 75 on postcard for more data

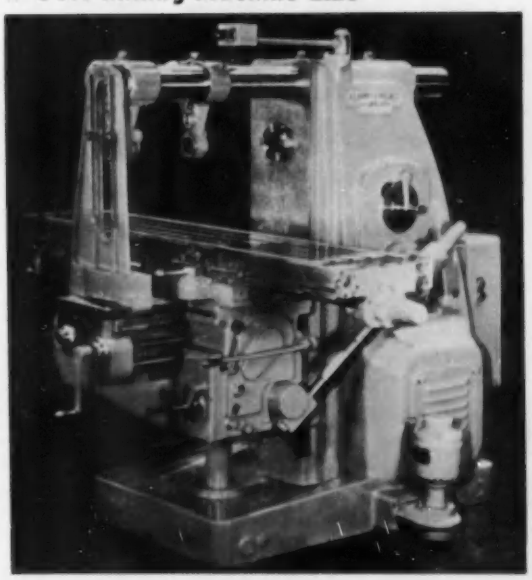
Semi-Automatic Bore Classifier



Rated capacity at 100 per cent efficiency of this six-cylinder bore gaging and classifying machine is 120 blocks per hour. It classifies bore diameters in 10 steps of 0.0003 in., inspects out-of-roundness and taper, and stamps the classification of each bore on the block. (Sheffield Corp.)

Circle 76 on postcard for more data

Low Cost Milling Machine Line



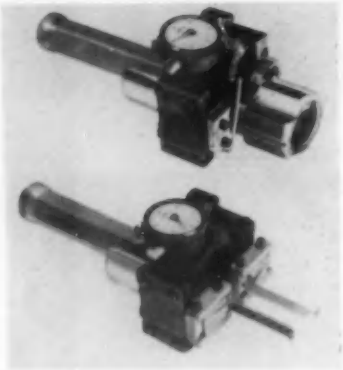
Model CE low cost milling machines for production, tooling or training are available in No. 2 (three hp) or No. 3 (7½ hp) size. Both sizes feature 16 quick-change speeds from 25 to 1300 rpm and feeds of ½ to 25 rpm. Both plain and universal styles are offered. (Kearney & Trecker Corp.)

Circle 77 on postcard for more data

NEW EQUIPMENT — PLANT • PRODUCTION

Two-Way Gage

INTERCHANGEABLE segments on a gage being introduced allow both internal threads and internal grooves to be checked with one gage. Model

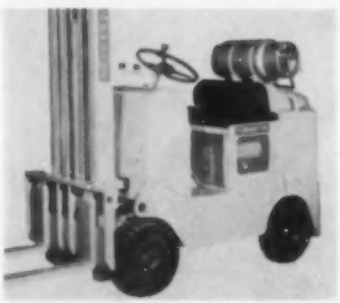


Segments for internal threads (top) and internal grooves.

P-21 is built on the principle of an "expanding" plug which actuates a precision dial indicator showing the size comparison of the part to a master setting ring. It will check threads of 5/16 to five in. diameter. It also provides a high-speed method of checking the diameter and roundness of internal grooves or recesses up to five in. in diameter and grooves located at depths up to one to two in. from a face. *Bryant Chucking Grinder Co.*

Circle 78 on postcard for more data

LP Gas Fork Trucks



All models of the manufacturer's line of fork lift trucks are available, gasoline or LP gas power. Present gasoline models may be converted, the company states. (Towmotor Corp.)

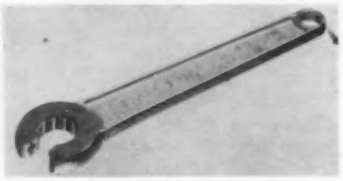
Circle 79 on postcard for more data

Transition Motor Line

POLYPHASE motors in the one to five hp range are now being built to the old NEMA specifications, but incorporating all of the advanced engineering and insulation features of the new Tri-Clad 55 motor. These transition motors will be available in most popular ratings. *General Electric Co.*

Circle 80 on postcard for more data

Open Ratchet



A one-piece open end ratchet wrench features a compact head using rollers to grip the work. All moving parts act directly on the work, and no trigger is used to reverse the action. (The Kramer Fabricating Co.)

Circle 81 on postcard for more data

Checks Pins for Hardness, Size

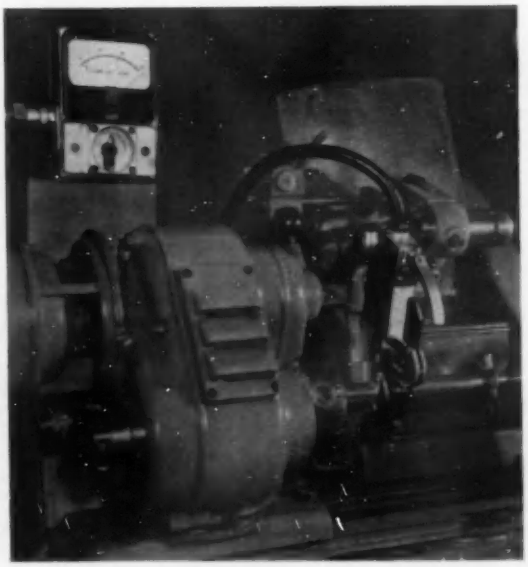
An automatic multiple action electronic and scleroscope-type sorting gage measures the hardness, overall length, triangular out-of-round, outside diameter and taper of automotive piston pins and sorts them into 10 size categories, including four OD groupings of 0.0001 in. each plus oversize and undersize. Its gaging and sorting speed is 4000 plus workpieces per hour. It is designed either for conveyor or manual feed and disposal. (Federal Products Corp.)

Circle 82 on postcard for more data

Micrometer Controls Grinder Cycle

An electronic micrometer now being offered is claimed to be capable of controlling automatically a grinding machine cycle to tolerances as low as 0.00004 in. Standard model CG-2 Electro-Autosizer is self-compensating for wear and other outside influences including temperature and moisture changes. Separate models of this gage and plug-in components are available for a combination of different phases or steps in production processes ranging from grinding to sorting. (Industrial Gauges Corp.)

Circle 83 on postcard for more data



Materials and Processes: Acid, Rubber, Asbestos, Plastic, Cleaner

Pickling Acid

Compound No. 131 is an acid detergent for pickling and scale removal operations. It is reported to remove light to moderate rust, heat scale, tarnish, and other oxides, as well as normal dirt; and to meet specification MIL-M-10578A, Type III. It is a non-viscous, amber colored liquid having a pH range of 1.5 to 1.0 at 70 F. It is soluble in water or alcohol in all proportions, and rinses easily in hot or cold water. Recommended temperatures range from room temperature to 160 F. *Oakite Products, Inc.*

Circle 84 on postcard for more data

Neoprene Lining

NeoLine is a corrosion-resistant neoprene lining that flows on like paint. The heavy duty coating can be heat or air cured. It is said to offer good resistance up to 200 F. Accelerators are packaged separately for a long storage life. *Pennsylvania Salt Manufacturing Co.*

Circle 85 on postcard for more data

Stable Silicone Rubber

W-96 silicone gum stock features so-called controlled reactivity. This is said to eliminate specialized compounding and curing techniques often required of the rubber fabricator. An important property is low compression set with negligible sacrifice of tensile strength and elongation. Carbon black fillers can be used. *Linde Air Products Co.*

Circle 86 on postcard for more data

Glass Reinforced Tapes

Scotch brand reinforced polyethylene tapes—No. 875 pressure sensitive, and No. 877 heat-sealable—have glass filaments sealed between the tape layers. Strength ranges from 100 to 150 lb per inch of tape width. Backings are resistant to most chemicals and the tapes remain flexible at —60 F. *Minnesota Mining and Manufacturing Co.*

Circle 87 on postcard for more data

Safety Cleaner

No. 400-K safety cleaner is said to be effective in eliminating fire hazards and reducing insurance costs. The cleaner is designed for cleaning dies, machines, tools, floors, and other areas with safety and economy. *Macco Products Co.*

Circle 88 on postcard for more data

Photo Aluminum

Processing of Photodized plates can be done with only a sun lamp, a tray for developing, and a hot plate for sealing, in subdued or normal room light. Exposure of templates, charts, and drawings can be made from film negatives, tracing vellum, etc. *Metalphoto Corp.*

Circle 89 on postcard for more data

Vinyl Sheet for Drawing

A calendered rigid vinyl sheet has been produced for makers of deep-drawn vacuum formed parts. It is being produced in thicknesses up to 0.04 in., in widths up to 51½ in. *Bakelite Co.*

Circle 90 on postcard for more data

Brazing Sinters

Low-temperature silver brazing alloys have been developed for use on porous sintered metal parts. The method consists of filling the pores just below the surface of the metal with colloidal graphite. This forms a non-wettable, non-absorbent coating. Either oil or water base emulsions are brushed or dipped on; the solvent is evaporated; and the surface is lightly brushed and degreased. Parts can be fluxed and brazed in the usual manner. *Handy & Harman.*

Circle 91 on postcard for more data

Corrosion Test Strips

Six types of metal corrosion test strips conforming to SAE specifications have been developed. Each strip is 3½ in. long and ½ in. wide, highly polished, numbered, and has a hole drilled in it at the top. They are available in tinned iron, cast iron (SAE 111), steel (SAE 1010), aluminum (SAE 24), brass (SAE 70B), and copper (SAE 71). *Chemical Specialties Manufacturers Association.*

Circle 92 on postcard for more data

Paper Thermometers

Heat sensitive papers change from white to black at a number of predetermined temperatures between 113 and 580 F. The changes are said to occur within a fraction of a second and with an accuracy of ±1 per cent of the stated temperature. They are said to be useful in reading oven temperatures, testing brake linings and heaters, and in a variety of other applications. *The Paper Thermometer Co.*

Circle 93 on postcard for more data

Aluminum Primer

A rust-inhibitive aluminum paste pigment is made up of strontium chromate and powdered aluminum. *Reynolds Metals Co.*

Circle 94 on postcard for more data

Asbestos for Laminating

Novabestos papers for laminating with glass-reinforced plastics impart a fine, smooth surface or highly fibrous inner structure. This results because they are made from single asbestos fibers in bundles, instead of tangled or clumped fibers. Various papers are available in several thicknesses up to 0.025 in., with up to 85 per cent glass filament content. They stretch and distort easily, especially sideways. They are compatible with all standard resin binders, using pressures from 15 to 200 psi. *Raybestos-Manhattan Co., Inc.*

Circle 95 on postcard for more data

Cutting Compound

High-hardness alloys are said to be more easily machined with Hypersav, a halogen-cresyl compound suspended in a coolant and filler. Containing no water or soap, the compound is similar to light grease in viscosity. It is said to be effective on close tolerance machining of such metals as titanium, beryllium-copper, and stainless steel. It is also said to be stable from —45 to 350 F, and to provide rust and corrosion resistance and lubrication where necessary. *Destiny Products Co.*

Circle 96 on postcard for more data

High-Speed Electrode

Stability and ease of handling are features of a low-hydrogen electrode recently introduced for high-speed welding. Named DH-170, it also offers improved striking and restriking characteristics, bead appearance and slag removal. *P&H Welding Equipment Div., Harnischfeger Corp.*

Circle 97 on postcard for more data

High Friction Asbestos

A steady coefficient of friction of 0.4 is announced for a molded brake lining called HF7. It is said to preserve the hard wearing, non-fade properties of medium friction molded types. Organic material is reduced to a minimum, for stability at high temperatures. *The Cape Asbestos Co., Ltd.*

Circle 98 on postcard for more data

(*Turn to page* 106, *please*)

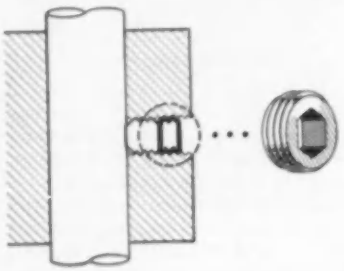
NEW PRODUCTS

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Air Horn for Vehicles, Industry

A musical safety or warning air horn is hand operated, to be independent of a factory air supply. Four models of different length and musical pitch are available complete with a hand pump either push or pull type, mounting straps and six ft of hose. They are designed in spun brass, chrome plated or finished in prime coat. They are applicable to trucks, buses, plant vehicles, lift trucks, etc., and also for plant signaling use. *Buell Mfg. Co.*

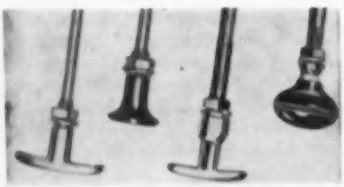
Circle 36 on postcard for more data



Lock Screw Designed for Set Screws

Hollow lock screws are designed specifically to hold socket set screws securely, when the part is subjected to excessive vibration or high speed. A heat-treated alloy steel lock screw features high strength. The hole permits the set screw to be adjusted without removing the lock screw. Hollow lock screws are being produced with coarse or fine threads, class three fit, in 12 diameters from No. 6 to one-in.; the length is ⅛-in. for smaller sizes and one-half the diameter for larger screws. *Mac-it Div. of Strong, Carlisle & Hammond Co.*

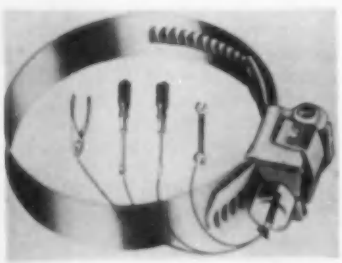
Circle 37 on postcard for more data



Push-Pull Control Line

Hi-Duty pushpull controls are designed for such applications as chokes, throttles and hood release, power take-offs, hydraulic valves and pumpers. Controls offered include: heavy-duty self-locking vernier control for pumpers on tank trucks; friction vernier control for throttles, chokes and other applications; a turn-to-lock control which will hold its setting even under extreme vibration; a heavy-duty control with 0.090-in. high carbon spring wire—available in three lengths; standard throttle and choke controls; and hood release. All controls except the three heavy-duty units have stainless steel wire, which requires no lubrication. *Imperial Brass Mfg. Co.*

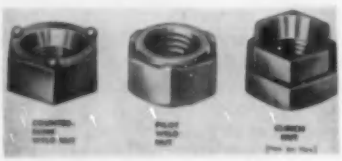
Circle 38 on postcard for more data



Variety of Hose Clamps Revealed

The geared hose clamp shown, in carbon or stainless steel, is one of four types just announced. With the long gear only five sizes fit hose from 9/16 to 4⅛ I. D. Take-up screw has hex head and screw slot. Others are universal, wire, and air or heater types. Two universal sizes are standard 10½-in. and tractor 14-in. for hose from ⅝ to 3⅝ I. D. Take-up screw is self-locking, clamp is zinc-coated rolled steel with rounded edges to protect the hose. Wire types feature "push-pulls" design for equal take-up. So-called double-grip wire presses into the hose without cutting. *Joseph Pollak Corp.*

Circle 39 on postcard for more data



Weld and Clinch Nuts in Stainless

Both pilot type and counter sunk Gripco weld nuts, and hexagon pilot clinch nuts are available in stainless steel, with and without the self-locking feature. Sizes available at present are 10-32 through ¼-in. fine and coarse threads. In the near future 5/16 and ⅜-in. sizes will be available. *Grip Nut Co.*

Circle 40 on postcard for more data

Free INFORMATION SERVICE

Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.

USE THIS POSTCARD

FREE LITERATURE

HSS Tool Bits 1

Molybdenum, tungsten and cobalt high speed steel bits, either finish ground or unground, are described together with proper grinding and mounting information in form 51-805. *The DoALL Co.*

Long Fork Truck 2

Forks which extend beyond the outrigger wheels are the features described in a bulletin released on Warehouser stand-up lift trucks. *Yale Materials Handling Div., Yale & Towne Manufacturing Co.*

Laminated Plastic 3

Over 35 types and grades of Insurok laminated and molded plastics are described in a 12-page bulletin. Applications using sheet, rods, and tubes and suggestions for working the material are also given. *The Richardson Co.*

Inserted Tips 4

Carbide tips, tools, throw-away blanks and holders are shown and specified in a 33-page catalog available from *Valenite Metals Corp.*

Tubing Analysis 5

The chemical analyses of carbon, alloy and stainless tubing steels for high temperature and high pressure applications are listed and cross-indexed with ASTM specifications and grades, in a new folder. *Babcock & Wilcox Co., Tubular Products Div.*

Press Hand 6

An automatic hand for press room automation is electrically controlled and operated mechanically or by air. A four-page folder gives layout drawings of the device, as well as specifications. *Hamilton Automation, Inc.*

Plastic Tooling 7

A 20-page manual illustrates the basic operations for building reinforced plastic tooling with thermo setting resins. *Marblette Corp.*

Axle Shafts 8

A description of its facilities for manufacturing axle shafts to precision standards is available in a folder published by *U. S. Axle Co., Inc.*

Body Slat 9

A 17-gage cold rolled steel slat for truck bodies, Part No. 602, has just been introduced in Vol. 6, No. 1 of *Parts News. Hart Metal Products Corp.*

Air Safety 10

Explosion and fire suppression systems for aircraft are explained in bulletin AD-372 published by *Simmonds Aerocessories, Inc.*

Air Signals 11

Four sizes of hand operated air signaling horns are announced in bulletin SD-73 just released by *Buell Mfg. Co.*

VOID After June 15, 1955 **4/15/55**

Circle code numbers below for Free Literature, New Plant Equipment or New Product Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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Controllers 12

Type H Speedomax indicators, recorders and controllers can be used to indicate or record temperature, provide two-position control, or three types of proportioning control, including automatic reset and rate actions. Complete information is provided in five data sheets, ND46-33 (100-104). *Leeds & Northrup Co.*

Phosphate Coating 13

An introduction to the use of phosphate coatings to protect metal surfaces is given in a brief pamphlet which describes the seven types of conversion coatings most commonly used. *Metalwash Machinery Corp.*

Air for Trucks 14

Specifications and pictures of six and 12-volt electric air compressors, a belt driven compressor, tanks and control valves for mounting on vehicles are provided in form SD-60. *Buell Manufacturing Co.*

Central Lube System 15

The Multival system of centralized lubrication for small machines or equipment with up to 12 bearings is cataloged and pictured on installations in an eight-page folder, bulletin No. 16. *Farval Corp.*

Automatic Welders 16

A comprehensive 54-page catalog pictures a variety of automatic welding machines, automation machines and special tools of various kinds for automatic assembly, boring, drilling and tapping. *Expert Welding Machine Co.*

USE THIS POSTCARD

Motor Brake 17

Dynamatic eddy-current brakes and associated controls, standard units in both air and liquid cooled types, are described in bulletin BR-1. Instruction details, capacities, characteristic curves and dimensions are listed. *Eaton Manufacturing Co., Dynamatic Div.*

O-Ring Catalog 18

A new catalog gives complete design information, recommended pressures, and available materials for both dynamic and static applications. No. AD-148. *The Garlock Packing Co.*

Single Point Presses 19

Specifications of Steelweld single point presses just introduced in sizes from 150 tons up are listed in a four-page folder, No. 2019-A. *Cleveland Crane & Engineering Co.*

Deep Drawing Machines 20

The latest version of the Hydroform catalog includes illustrations and specifications of the new eight-in. flexible die deep drawing machine, as well as the 12, 19, 23, 26, and 32-in. machines. Twenty-four page booklet No. M-1759-3. *Cincinnati Milling Machine Co.*

Manifolds 21

Hydraulic circuit control manifolds for machines are pictured and described in a folder available from *Almo Tool Co.*

Plastic Tooling

"A Manual for Reinforced Plastic Tooling," is a 20-page illustrated handbook on the fabrication of plastic tools such as spotting racks, checking and inspection fixtures, welding and assembly fixtures, duplicate die models, and others. Write to the *Marblette Corp., 37-21 Thirtieth St., Long Island City 1, N. Y.*

Nitriding Process

A 48-page handbook includes graphs and charts of the Floe process for nitriding and a description of Nitralloy steels, equipment, installations, and chemical reactions produced by the process. Write to *Nitralloy Corp., 230 Park Ave., New York 17, N. Y.*

Plating Facilities

Facilities in a new plating plant with open capacity are described in a 32-page bulletin. The company does precision plating on small parts, and the booklet stresses the importance of close tolerance work. Write on company letterhead to *Standard Pressed Steel Co., Box 611, Jenkintown, Pa.*

VOID After June 15, 1955 **4/15/55**

Circle code numbers below for Free Literature, New Plant Equipment or New Product Information

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YOU CAN COUNT ON CONTINENTAL FOR EVERY FASTENER NEED!

Only Continental Engineers Are Specially Trained for Special Fasteners!

Read why they now lead the industry in special fastener production

Each engineer at Continental is required to undergo thorough experience producing ground thread taps and gages, with their exacting screw dimensions. This special training in the highest standards of precision is passed on to you in every Continental product—at no extra cost.

Continental's superior accuracy and greater thread uniformity has boosted it to the top of the industry in the production of special fasteners—with an average of over 6500 different blueprints turned out each week. Many times, Continental cold forged fasteners have been substituted for expensive screw machine products; improving the product by increasing its strength while reducing its cost.

Why not put your special fastening needs in the most experienced hands? Call or write today and talk over your problem with the Continental engineers.

Continental Screw Co.

Manufacturers of Holtite Fastenings

NEW BEDFORD, MASSACHUSETTS, U. S. A.

NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Bolts of Titanium Now Successful

Part-for-part substitution of titanium for steel bolts in high-strength applications is now feasible. Weight savings of as much as 1000 lb per airplane are said to be possible.

Production is underway on titanium bolts that are 25 per cent stronger in fatigue than comparable steel bolts—50,000 psi for eight million cycles compared to 40,000 for steel. Under a standard 77,000-psi load titanium bolts averaged over 100,000 cycles before failure, to meet MS 20004 for high-strength fasteners. Weight is about 57 per cent that of comparable steel bolts. Shipments of ½-in. bolts have been made to the aircraft industry, with S-N curves accompanying each sample. Other sizes also are in production. Cost is said to be in the neighborhood of $100 per pound, compared to $1.50 for steel bolts. But weight savings in aircraft is said to be worth as much as $200 per pound.

Special hot forging techniques, and close attention to threads, fillets, and surface roughness are necessary to produce satisfactory titanium bolts, according to the manufacturer. Tensile strengths of close to 150,000 psi are now reached. The alloy used is four per cent each of aluminum and manganese. Surface finish is held to

eight microinches. *Standard Pressed Steel Co.*

Circle 46 on postcard for more data

Power Supply

Requirements of specification MIL-E-5400 are said to be met by an encapsulated high voltage power supply now available. Operating from 115 v, 400 c source, it delivers 51 kv at 7.5 ma, 6.3 va-c at 1.5 amp and 0.5 amp. The high voltage transformer, full-wave bridge selenium rectifiers, filter capacitor and bleeder resistors are all made up in one package. Fin construction is used to dissipate heat. Operating range is –80F to 185F; size is 4 by 4 by 6 in.; weight is 6½ lb. *Telectro Industries Corp.*

Circle 47 on postcard for more data

For Ground Cooling

Portable ground air conditioning unit for cooling aircraft electronic components and comfort cooling is rated for continuous duty, has a capacity of 80 lb per minute at three psig and 45F., meeting this capacity in ambient conditions to 120 FDB and 75 FWB. Output capacity is fully automatic for any ambient temperature. Drive is by electric motor, or gasoline engine. The unit includes a York six cylinder compressor, and a Roots type blower. *Electroflo, Inc., Div. of American Electronics Inc.*

Circle 48 on postcard for more data

Hydraulic Motor

Light weight hydraulic motors are being offered which require only four bolts for mounting. Rated for continuous operation, with shaft speeds up to 4000 rpm and pressures up to 3000 psi, the units will supply up to 150 or 225 lb-in. of torque, or 9.7 or 14.3 hp. The units, which weigh from 6 to 6.8 lb, are designed to meet Specification MIL-M-7997. *United Hydraulics, Inc.*

Circle 49 on postcard for more data

External Ejector

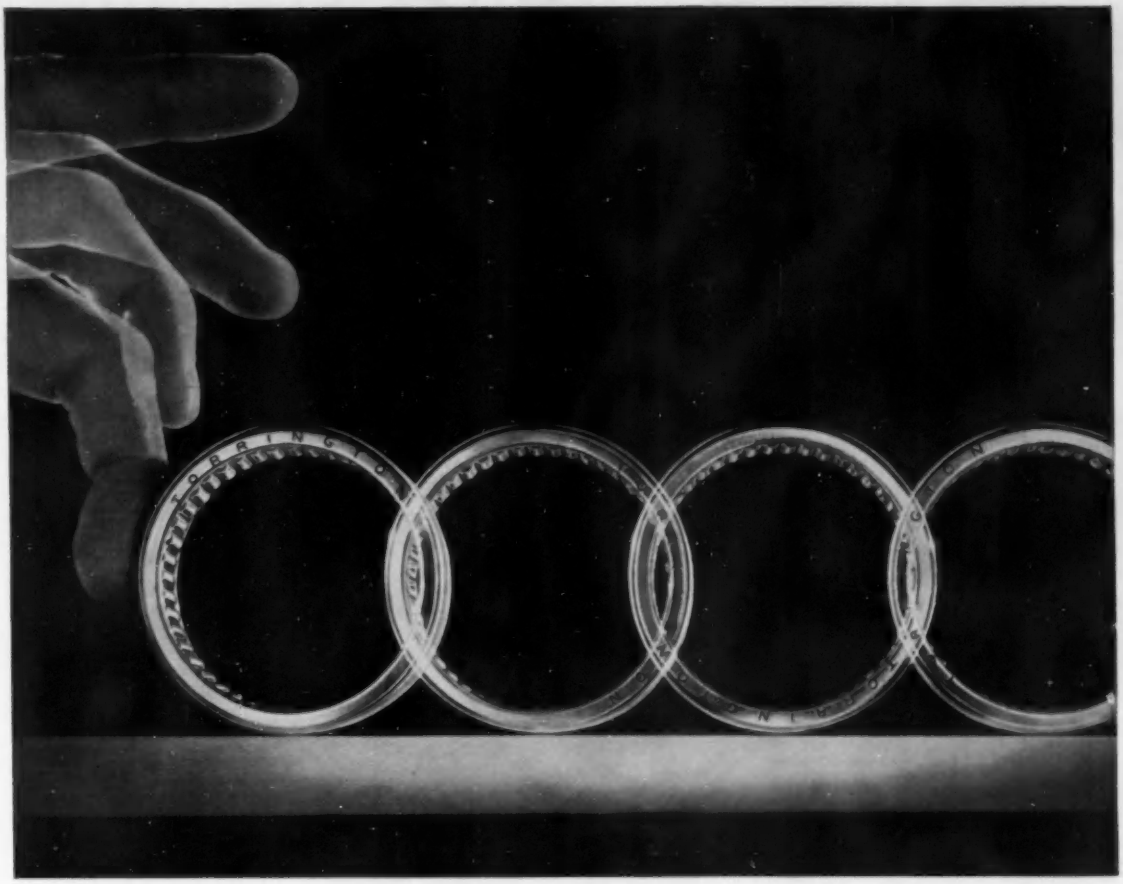
A dual piston ejector rack is designed to provide carriage, suspension, release and separation of external stores from military aircraft at transonic or supersonic speeds. The rack consists of a two-hook carriage and suspension system for either 14-in. or 30-in. center-to-center lug spacing. Hook loads are designed to withstand 120,000 lb ultimate. The rack may be stressed integral with pylon or mating structural assemblies.

Dual telescoping pistons on each rack exert 20,000 to 30,000 lb average force through a stroke of eight in., and produce uniform acceleration curves with low peak forces. Force is exerted directly into the mounting lugs of the respective stores.

With the exception of the electrical impulse (28 v to the cartridge) the system is entirely mechanical. Space has also been provided for either mechanical or electronic arming devices. It may be ground-locked for safety and includes a mechanical safety release.

Where drag loads or fore and aft loads are of a high figure, sway brace configuration may be designed integral into the rack. The weight of the 14-in. ejector is approximately 30 lb; the 30-in. ejector weighs about 45 lb. *Bohanan Manufacturing Co.*

Circle 50 on postcard for more data



"It takes less push . . . to start a **TORRINGTON NEEDLE BEARING"**

The Torrington Needle Bearing has a low coefficient of friction—both in starting and in running. Therein lies a boon for designers and manufacturers.

Unlike a plain bearing which has a fairly high starting coefficient of friction—the Needle Bearing needs no more push to "get it going" than to "keep it going."

Nor are the frictional characteristics of the Needle Bearing dependent upon maintaining a continuous oil film as is a plain bearing. This all adds up to inexpensive and simpler designs, smaller drive motors and dependability.

For twenty years our engineering department has helped designers and manufacturers throughout industry to adapt the unique characteristics of the Needle Bearing to their products. Let us help you make the Needle Bearing "standard equipment" in yours.

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Needle • Spherical Roller • Tapered Roller • Cylindrical Roller • Ball • Needle Rollers

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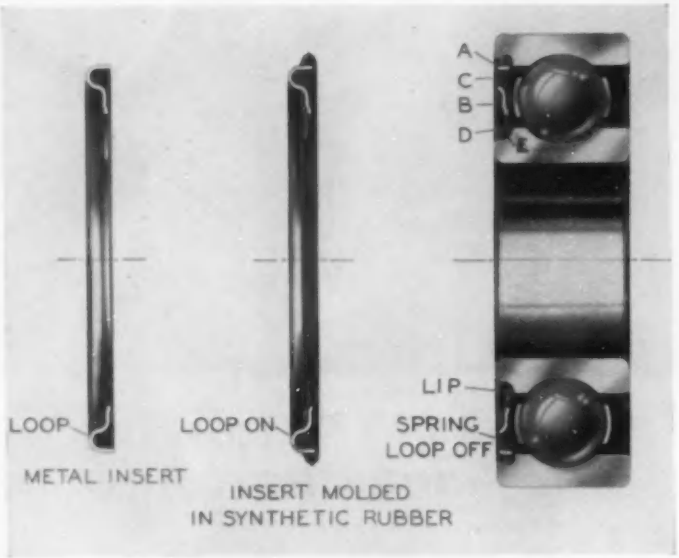
- low coefficient of starting and running friction
- full complement of rollers
- unequalled radial load capacity
- low unit cost
- long service life
- compactness and light weight
- runs directly on hardened shafts
- permits use of larger and stiffer shafts

Machine Tool Ball Bearings DISCUSSED AT CONFERENCE

LIMITING SPEED OF GREASE-LUBRICATED BALL BEARINGS		
TYPE OF SEPARATOR	SPEED, F.P.M. I.R. BALLRACE	AV. TEMP. RISE, °F.
STEEL PRESS METAL	3500	+25°
NON-METALLIC SOLID RING	5000	+25°
SPECIAL DESIGN & MATERIAL	14,000	+220°



Z-type seal construction

DUE to the high order of production in American manufacturing, it is anticipated that machine tools of the future will be operating at higher speeds and working to closer tolerances. This will provide better finishes and will handle new alloys with a minimum amount of downtime. Because of these factors which will affect future design, the New Departure Div. of GM recently held a machine tool ball bearing conference in Hartford, Conn. This conference had three basic objectives. As stated by Paul W. Rhame, General Manager of New Departure, these were:

"To develop mutual understanding and knowledge of the engineering problems of today and tomorrow related to the application of ball bearings and machine tools."

"To develop concrete ideas for solving these engineering problems."

"To add machine tool ball bearing knowledge to the background and experience of the conference participants."

In addition to the six panel discussions held during the conference, New Departure arranged a trip through its Bristol, Conn., plant for the 160 conference visitors. The planned trip was so designed to show research and development, testing procedures, and manufacture of machine tool ball bearings. Conference guests were very much impressed with the degree of testing and the types of machines utilized for the manufacture of high quality ball bearings.

At the first panel discussion which dealt with future ball bearing requirements, it was disclosed that New Departure is working on new materials and processes for increasing bearing load capacity. There is much research being carried out on fatigue life and the use of vacuum melted steel as a bearing material. It is felt that this cleaner steel has a decided effect on increasing fatigue life due to minimum residual stresses. There is also work being carried out on shot peened bearings to control the stress concentrations. General Motors research is engaged in examining certain bearing type steels using such equipment as X-ray diffraction and the electron microscope.

On the subject of smaller tolerances for ball matching and balls, New Departure stated that a standard grade of ball is spherical within 0.000010 in. and an instrument grade is spherical within 0.000005. A further reduction in spherical tolerance will depend solely on equipment to sort balls in finer increments.

Members of the first panel, when asked the requirements for high speed operation of machine tool precision spindles, responded that the shaft and

(*Turn to page* 140, *please*)

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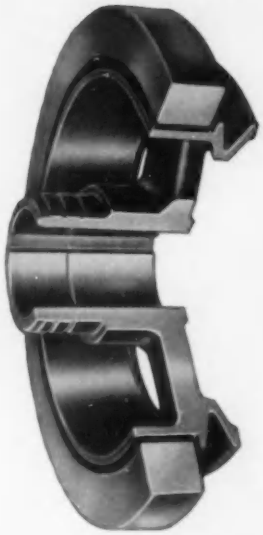
A FEW OF THE FAMOUS MANUFACTURERS THAT ARE USING THEM



Leading engine manufacturers have found satisfactory solutions to their crankshaft torsional vibration problems with these Non-Bonded rubber units that give outstanding performance and service life at an economical price.

We have continuously expanded and improved our production facilities to the end that we can satisfactorily serve your requirements. Millions of our dampers have proven themselves over the years in an innumerable variety of applications.

Our engineering and development facilities enable us to provide sound and complete damper designs for your engines. We will appreciate the opportunity to serve you and will welcome your inquiry.

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The BUSINESS PULSE

Increased Business Activity Spreading from Construction and Automobile Booms to Wide Range of Other Industries. Present Plans Call for Greater Capital Outlay than During Last Year.

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

Business Expansion Continues

Business activity has now been rising for more than six months. The outstanding thing of significance about the uptrend at this juncture is that it shows signs of spreading. The automobile and construction booms, though they are still the primary elements of strength, are of less relative importance than they seemed to be a few months ago, because it is clear now that numerous other industries are participating in the upswing. This encourages the hope that over-all business may be sustained at higher levels in the second half of the year, even with the expected decline in automobile output, than observers had thought likely a few months ago.

There is, of course, a continuing need for caution, since the outlook is still characterized by a good many uncertainties; and while these may be clarified to some extent in the spring testing period, they will not finally be resolved until summer or autumn, and conceivably not even then.

The change which has occurred in the character of the uptrend—that is, its broadening—suggests the need for a reappraisal of longer-term prospects. This involves, first, a review of the principal developments of the past six months.

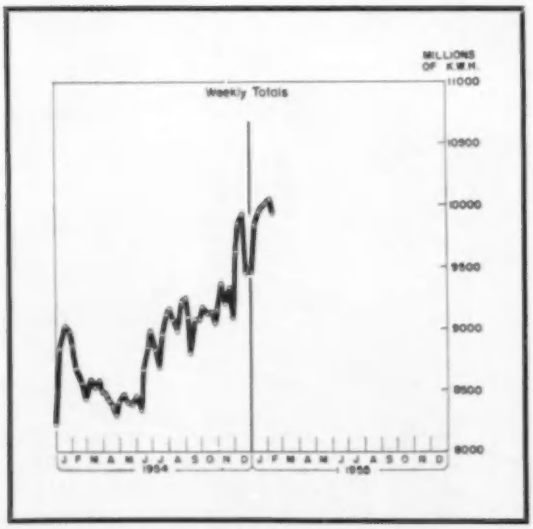
Review of Developments

It is instructive to recall the state of business sentiment that prevailed in the weeks immediately after Labor Day. At that time it was generally agreed that the business decline which had been under way since mid-1953 was at or near an end. Inventory liquidation appeared to be just about over, and the downward tendency of Federal expenditures seemed to be abating. This left producers' durable equipment as the only major component of gross national product still exhibiting a significant downtrend, and this single minus factor seemed to be more than compensated for by strength in the pattern of consumer expenditures, and State as well as local government outlay.

But though the decline seemed at an end, the question that was being asked over and over again was, what sectors of the economy are going to provide the stimulus for sustained recovery? Few answers were forthcoming from analysts. There was recognition of the fact that automobile manufacturers were planning extremely high production for the final two months of the year, but since these schedules were geared to restocking dealers with new models, rather than to long-term prospective demand, there was fear that the impact on general business from this source might weaken sharply after a few months.

(*Turn to page* 174, *please*)

ELECTRIC POWER PRODUCTION



Source—Edison Electric Institute and National Research Bureau

AIR BRIEFS

By RALPH H. McCLARREN

Welding Titanium

Marquardt Aircraft Co., Van Nuys, Calif., has developed a fusion method for welding unalloyed titanium sheet without filler rod to produce joints that are flush with the base metal and have high ductility. The welded joints can be made by hand or automatic methods. A critical requirement of this type of weld is exact fit of the parts to be joined. Backup and hold-down fixtures also are very important and can affect the finished weld. A sheared surface resulting in a no-gap joint is a must.

Fused welds have been principally used for longitudinal, tight butt joints in material up to 0.062 in. thick. It is expected that thicker material will be used after further testing and experience. It is said that welded samples have been bent 180 deg over a 2T bend radius exhibiting ductility equal to, or greater than, the base metal. Welds tested in tension have exhibited over 100 per cent efficiency in all cases. Elimination of welding rod has reduced the amount of contamination in the weld and the weld area. Another obvious advantage is the elimination of weld bead grinding.

Identification Radar Beacons

A radar beacon system installed on aircraft along with minor modification of the radar transmission equipment will provide greatly improved surveillance radar traffic control procedures. Use of the identification radar beacon will assure an automatic positive "reply" from radar beacon equipped aircraft to the surveillance ground radar and more rapid and efficient identification of aircraft through the use of a system of codes which identify the aircraft on the air traffic controller's radar scope. Improved ease and reliability of tracking aircraft from both the air traffic control and air defense standpoint should result from use of the new equipment. Improved radar coverage in the fringe areas, facilitating the identification of various flights in areas of heavy traffic, and improvement of identification and tracking aircraft when there is moderate to heavy rain are additional advantages.

At a recent meeting of airline representatives held at Indianapolis, Indiana, under the auspices of the Air Transport Association the airlines agreed to equip their aircraft with identification radar beacons. This action initiated a $5 million program for procurement and installation of airborne radar beacons.

Colonel J. Francis Taylor, Director of the Air Navigation Development Board, advised the meeting that military ground radars will be equipped to identify aircraft equipped with radar beacons. He also advised that military aircraft were being equipped with these radar beacons at the present time. Milton W. Arnold, vice-president-operations and engineering of the Air Transport Association, commented that the military and civil beacon operations will be compatible.

This marks a forward step in the continued improvement of aircraft equipment and operations to provide safer flying. It also marks another step forward in the development of an ultimate all-weather air-traffic control system compatible for both civil and military aircraft operations.

Business and Industrial Flying

We think of scheduled air transportation as big business. It has grown tremendously during the past

(*Turn to page* 104, *please*)

PERCENTAGE OF HOURS FLOWN BY TYPES DURING 1953*

Type of Flying	Hours	Per Cent of Total
Business	3,626,000	42
Aerial Application	722,000	8
Patrol and Survey	353,000	4
Passenger and Cargo for hire	574,000	7
Instructional	1,248,000	15
Pleasure Flying	1,846,000	22
Civil Air Patrol, experimental and other	158,000	2
Total for General Aviation	8,527,000	100
Compared to U. S. Scheduled Airlines:—		
General Aviation	8,527,000	73
Scheduled Domestic	2,403,000	22
Scheduled International	456,000	4
Certified Cargo Carriers	100,000	1
TOTAL Flying	11,145,000	100

* Latest complete figures available

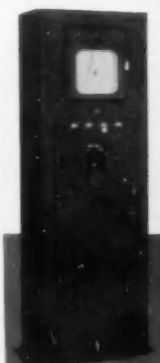
STANDBY ENGINE POWER

Many of the Air Lines have installed automatic engine driven pumps in their hangars at the principal air terminals to insure against failure of water supply in case of fire.

Also, most main air terminals have automatic standby generator sets which will supply current for the lights and control tower within a few seconds, should the commercial source of power fail.

SYNCHRO-START has been making the controls for these power plants for the past twenty (20) years and have the "know how" to build controls that remain dependable. They are in use for every conceivable power application on land, sea, air, and in the mines.

The Universal Automatic Engine Control panel shown, is for fire protection to automatically START-STOP, and give the ALARM when needed and to record the operations including automatic test runs. They are accepted as wholly dependable protection against fire by insurance companies and are in use in a great many of the nations largest industrial, public, and residential buildings.



These panels are manufactured exclusively for Alexander F. Barron, 53 West Jackson Boulevard, Chicago 4, Illinois, who are suppliers of fire protection equipment.

We can furnish controls to meet any application where Gas, Gasoline, or Diesel engine power is used. Write us for our catalog and address of our nearest representative.

SYNCHRO-START PRODUCTS, INC.

Automatic Engine Control Equipment

3151 NORTH RIDGEWAY AVENUE, SKOKIE, ILLINOIS

Newly elected national officers of the American Society of Tool Engineers for the coming year are, left to right: (seated) Dr. H. B. Osborn, Jr., president; H. E. Collins, second vice president; H. C. McMillen, first vice president; (standing) R. C. W. Peterson, third vice president; Wayne Ewing, fourth vice president; John X. Ryneska, secretary; and Harold D. Long, treasurer.

ASTE Holds 23rd Annual Meeting and First Western Exposition

HIGHLY successful" was the consensus of the large gathering at the first Western Industrial Exposition at Los Angeles last month, sponsored by the American Society of Tool Engineers. The society conducted its 23rd annual meeting, and the two events attracted over 10,000 registrants. Over 35,000 were counted at the door of the show.

The newly elected president is Dr. Harry B. Osborn, Jr., technical director of the TOCCO Div., Ohio Crankshaft Co. He succeeds Joseph P. Crosby, vice-president of Lapointe Machine Tool Co. At the annual banquet, at which the officers were installed, the principal speaker was Prentiss M. Brown, of the Detroit Edison Co. He commented on the problems of developing atomic energy for peacetime applications.

Ernest R. Breech, chairman of the Ford Motor Co., received the 1955 ASTE Progress Award. The citation stated:

"Foremost manufacturing executive . . . with proved genius for integrating materials, methods, manpower, facilities and human relations into overall organization of highest efficiency. He has foresight in analyzing demands of the future, has greatly accelerated the advancement of automotive transportation."

Philip M. McKenna, president of Kennametal, Inc., received the ASTE engineering citation for "original and important contributions to the development of carbide materials and tools . . ."

New officers are: H. C. McMillen, plant manager, Philco Corp., first vice-president; H. E. Collins, Hughes Tool Co., second vice-president; R. C. W. Peterson, owner, Peterson Engineering Co., third vice-president; Wayne Ewing, president of Arrowsmith Tool and Die Co., Inc., fourth vice-president; Harold D. Long, president of Scully-Jones & Co., treasurer; and John X. Ryneska, General Electric Co., secretary.

The Society created the office of fourth vice-president in place of the previous office of assistant secretary-treasurer. It also elected three new directors. They are: William Moreland, Greenlee Bros. and Co.; W. A. Thomas, division superintendent, Ford Motor Co. of Canada Ltd.; and R. C. W. Peterson. Re-elected to the board of directors are: A. B. Clark, technical consultant, Haynes-Stellite Co.; W. G. Ehrhardt, managing partner, Ehrhardt Tool and Machine Co.; G. A. Goodwin, chief process engineer, The Master Electric Co.; J. O. Horne, owner, J. O. Horne Co.; C. M. Smillie, owner, C. M. Smillie & Co.; R. A. Smith, chief tool engineer, Pratt & Whitney Div., Niles-Bement-Pond Co.

Dr. Osborn, H. C. McMillen, H. E. Collins, Wayne Ewing and Harold D. Long also were elected to the board. As immediate past-president, Joseph P. Crosby automatically will become a board member.

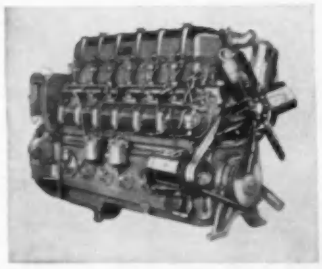
Six plant tours attracted a large audience, including inspections of AiResearch Mfg. Div., North American Aviation, National Supply Co., McCulloch Motors Corp., Byron-Jackson Co., and Lockheed Aircraft Corp.

Many new developments on display at the Exposition were described in AUTOMOTIVE INDUSTRIES, March 1, beginning on page 52.

Plastic tooling cost advantages were explored at one of several interesting panel discussions. This session was co-sponsored by the Society of Plastics Engineers. John Delmonte, Furane Plastics, Inc., outlined properties of the newest addition to the family of tooling resins—the epoxies. Discussing selections of the proper material, he pointed out that the hardest surface does not necessarily indicate the toughest

(*Turn to page* 166, *please*)

when to look a horse in the mouth



Horsepower 30 to 255
Two-cycle • 2-, 3-, 4-, 6-cylinder models • Speeds to 1800 rpm
Stationary, mobile, marine
Diesel-generator sets

The answer is, *whenever you buy horsepower.*

Horsepower ratings can be tricky. An engine rated at 90 h.p. in the laboratory may produce far less on the job.

For the P&H Diesel, we've chosen a more realistic measurement. *Working* horsepower. Buy 90 h.p. and you *get* 90 h.p. — at the drive shaft, where you can put it all to work.

Of course, when you're looking at diesels, you'll want to look at the cost. When you do, you'll learn that a P&H costs less per horsepower than any other. Look again, and you'll see that it delivers more horsepower for every pound of weight. Once more, and you'll find that of all the diesels this one is the easiest to service.

Why look further?

P&H Diesel Engine Division, Harnischfeger Corporation, Crystal Lake, Ill.

THE P&H DIESEL

lowest price per horsepower
lowest weight per horsepower

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Continued from Page 39

Westinghouse Forms New Unit To Make Torque Converters

Schneider Manufacturing Corp., Muncie, Ind., a wholly-owned subsidiary of Westinghouse Electric Corp., has been dissolved to form the Hydraulic Drives Dept. of the Westinghouse Gearing Div. Schneider was purchased by Westinghouse in October, 1954.

The Hydraulic Drives Dept. will sell, engineer, and manufacture hydraulic torque converters and associated brakes and transmissions. Headquarters will remain at Muncie, Ind.

Roadbuilding Boom Spurs Expansion At Caterpillar

Confident that 1955 will show a big upturn in the earthmoving business, many manufacturers are spending sizable amounts of money to bring their facilities up to date for production of various types of roadbuilding equipment. Caterpillar Tractor Co., for example, this year will put its sixth U. S. plant into operation in Decatur, Ill., and dole out about $3 million for a new wholly-owned subsidiary in Sao Paulo, Brazil. Altogether, the company estimates that it will spend more than $21 million on expansion this year to bring the total expenditures since World War II to more than a sizable $200 million.

Although Caterpillar sales to commercial users and the Government declined in 1954, profits showed a substantial gain in totaling $25 million, against $20 million in 1953. Sales amounted to $401 million, compared with $433 million the previous year, as government orders dropped by more than 25 per cent to $13 million.

L-M and Chrysler Div. Announce Prices for Montclair, Imperial

Lincoln-Mercury has put a suggested list price of $2450 on the new Mercury Montclair sedan (see AI, Jan. 15, p. 34). Federal, state or local taxes, optional equipment, and accessories are extra.

Chrysler Div. of Chrysler Corp. has announced new prices for the 1955 Crown Imperial line. Factory retail prices at Detroit, Mich., are as follows: Crown Imperial eight-passenger sedan, $6406; Crown Imperial limousine, $6520.

Aeroquip Acquires Maker Of Aircraft Components

Aeroquip Corp. has announced the acquisition of Marman Products, Inc., Los Angeles, Calif., manufacturer of pipe clamps, flex joints and valves, for an undisclosed price. The acquisition was described as an important step in Aeroquip's program of expansion and diversification.

Die Casting Society Organized in Detroit

A new technical society, named the Society of Die Casting Engineers, has been formed to further technological advances in the field of die casting and finishing of metals as well as in die molding of plastics and powdered metals. A major aim is the development of modern standards for the die casting industry.

Membership in the Society of Die Casting Engineers is open to those whose business activities relate to die casting, die molding, finishing, and related arts. The new society's national headquarters and offices will be located at 19370 James Couzens Highway, Detroit 35, Mich.

Van Zee Is Named President Of ICEI at Recent Meeting

Newly elected president of the Internal Combustion Engine Institute is B. G. Van Zee. He is chief engineer, Automotive Engineering Div., Minneapolis-Moline Co.

Other officers elected at the Institute's recent meeting were: vice-president—E. Don Tull, vice-president and general manager, Cummins Engine Co., Inc.; secretary—H. W. Smith, consulting engineer, Engine Div., Caterpillar Tractor Co.; and treasurer—Phil Norton, vice-president in charge of sales, Wisconsin Motor Corp.

EVERY SECTION OF COUNTRY SHOWED GAINS IN JANUARY OVER LAST YEAR

Regional Sales of New Passenger Cars

Zone	Region	January 1955	December 1954	January 1954	Per Cent Change: January over December	Per Cent Change: January over January 1954
1	New England	25,571	25,391	17,865	+ .71	+43.13
2	Middle Atlantic	79,686	130,086	61,011	−38.54	+31.06
3	South Atlantic	61,342	77,623	45,572	−20.97	+34.60
4	East North Central	109,911	167,254	86,450	−34.28	+27.14
5	East South Central	21,985	33,246	17,046	−33.87	+28.97
6	West North Central	41,019	65,171	30,451	−37.06	+34.70
7	West South Central	36,915	66,140	36,234	−44.19	+ 1.88
8	Mountain	12,193	22,922	10,563	−46.81	+15.43
9	Pacific	51,129	69,750	35,596	−26.84	+43.64
	Total—United States	440,024	658,681	340,788	−32.90	+29.12

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan., Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Cal., Ore., Wash.

***The Oakite CrysCoat Cleaning-Phosphating Process for preparing metals for painting*

SINGER—is world-famous for sewing machine efficiency, design and workmanship. And beneath the fine finish of the many models of this splendid machine is a protective coating of CrysCoat to make it look better . . . last longer.

There's an Oakite CrysCoat Process to suit your particular set-up:—

1. Zinc phosphating in spray washer
2. Zinc phosphating in tank
3. Iron phosphating in spray washer
4. Iron phosphating in tank

Each CrysCoat Process gives you a fine phosphate foundation for long-lasting paint adhesion.

Each CrysCoat Process protects against corrosion under the paint.

Each CrysCoat Process is easy to control.

Each CrysCoat Process is solidly backed by nationwide Oakite Service that unconditionally guarantees satisfaction.

Illustrated literature describing the Oakite CrysCoat Cleaning-Phosphating Process gladly mailed on letterhead request.
Oakite Products, Inc., 26H Rector Street, New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS · METHODS · SERVICE
SCIENCE

CrysCoated Products Look Better . . . Last Longer!

Technical Service Representatives Located in Principal Cities of United States and Canada

AIRBRIEFS

(*Continued from page 98*)

10 years, but — although the scheduled airlines in the United States flew a grand total of 2,403,000 hours in 1953, flying in other civil aircraft for business, industry and pleasure was more than three times as much —8,186,000 hours.

This kind of flying, other than by scheduled airlines and the CAA, is referred to by the Civil Aeronautics Administration as General Aviation.

General Aviation flying includes:

Business Flying: use of aircraft by companies and individuals in carrying out in their own aircraft operations of their given enterprises or professions.

Aerial Application: use of aircraft in dusting, spraying and other agricultural activities.

Patrol, Survey and Other Industrial Flying: use of aircraft to patrol public utility properties; pipe, power and telephone lines; aerial photography and mapping surveys; wildlife survey and commercial fishing.

Passenger and Cargo Transportation: use of aircraft for hire including air taxi service, fixed base operators flying special charter or contract flights, and large irregular carries (excluding their military contract flying).

Instruction: use of aircraft for instructional flying including both dual and solo time.

Pleasure: use of aircraft for pleasure flying.

New Vertical Gyro

A radically new type of vertical gyro of improved performance to reduce and stabilize free drift error has been developed and placed into production by Lear, Inc., of Grand Rapids, Mich.

The new gyro is made of steel throughout and in use it provides a vertical reference for such gyro stabilized equipment as remote attitude indicators, autopilots and bombing systems.

Delivery of Utility and Executive Aircraft

During January, 1955, a total of 328 one to 10-place utility and executive aircraft were delivered by six aircraft companies. The shipments included 270 planes of four place or more, and 58 one- and two-place aircraft with a total dollar value of $4,417,000. This compares to a December 1954 shipment of 273 planes valued at $3,924,000. Piper Aircraft delivered the most—142, Cessna was next with 124, then Beech with 56, Aero Design with four, and Mooney and Taylorcraft with one each.

USAF Is World's Biggest Business

The United States Air Force, buying more than a million separate items a year, continues to be the biggest business in the world. By July, 1956, the Air Force will have bought more than $25 billion worth of aircraft of all types and related equipment since the outbreak of war in Korea in June, 1950. During the next 18-month period alone, the Air Force will take delivery on approximately $10 billion worth of supplies and equipment.

Best example of the tremendous Air Force purchasing program needed to maintain U. S. air supremacy is that USAF, during a recent seven-month period, made 524,864 contracts to buy $2,557,598,000 worth of items.

NEWS OF THE MACHINERY INDUSTRIES

(*Continued from page 79*)

Research Results on Shot-Peening Titanium

Recently an investigation of the use of shot peening on titanium and titanium alloys was made by the Cargill Detroit Corp. The objective was to determine the degree of curvature attainable in the usual strip specimens employed in evaluating shot peening specifications. Results are summarized briefly below.

Samples submitted for this test—0.032 and 0.072 in. thick—were sheared into ¾ x 3-in. strips. Held in the usual type of fixture, the strips were subjected to perpendicular impact of chilled iron shot, using an oscillating arm support for the nozzle to assure uniform distribution of shot over the strip.

Using several ranges of pressures, three different ranges of time, and shot sizes of 0.017 and 0.055 in., final results indicated that shot peening will induce radii of curvature of considerably less than ½ in. in strips

(*Turn to page 106, please*)

Leipzig Fair

(*Continued from page 59*)

Drive is through a five-speed gearbox providing a maximum of 10.5 mph.

One new Czechoslovak engine for heavy-duty work was a compact V-12 Diesel rated at 450 hp at 1360 rpm max. Direct injection is used, compression ratio is 15.8 to 1, and bore and stroke are 6.69 in. and 7.48 in. For some unexplained reason the Czechs' new Spartak automobile was not exhibited, although it was shown at Brussels in January. Nor did they bring their new Zetor Super tractor to Leipzig. A few details were available on this, however. The machine is supplied with wheels or tracks, with a change-over in two hours stated to be possible. The four-cylinder Diesel of 254 cu in. displacement puts out 42 hp at 1500 rpm. There is a five-speed gearbox with one reverse, and the wheeled version has a rear pto and belt pulley.

A number of engines built by Communist China were at the Fair. Like most of the other Chinese engineering exhibits, several of these were based on Russian designs, although one was indicated as a Czechoslovak engine. This was a four-cylinder industrial Diesel rated at 90 hp at 750 rpm with 6.29 in. bore and 8.85 in. stroke. A larger six-cylinder Diesel was rated at 120 hp at 1000 rpm. China also displayed a trailer-mounted six-cylinder Diesel, driving a V-form air-cooled compressor.

Poland exhibited its Ursus C.45 wheeled tractor, which appears to be a close replica of the German Lanz Bulldog. This has a single-cylinder horizontal Diesel engine of the hot-bulb type developing 38 hp at 630 rpm. Russia's only novelty in the automotive line was a D-159B bulldozer based on the DT-54 crawler tractor and a D-271 mounted on the larger S-80.

Non-Communist participation at the Leipzig Fair this year reached a postwar high, and West German industry in particular made an exceptionally strong showing. Iron and steel, heavy engineering and machine building, and machine tools predominated among the 1600 firms from the Federal Republic which exhibited (compared with 1120 last September and 620 in 1953). Few vehicle manufacturers were represented, but the West German tractor industry was there in strength. There were large outdoor displays by International Harvester GmbH (Neuss), Allgaier, Hanomag, Normag, Lanz and others.

TUTHILL PUMP COMPANY EXPERIENCES...

"NO FAILURES

SINCE USING

SAVES MONEY, TOO!"

● Tuthill knows the rotor is the heart of their pump. Quality cannot be compromised. For more than 10 years, Tuthill has used STRESSPROOF for rotors (replacing heat-treated alloy steel) without a failure!

Strength is required in these rotors to transmit the power through the shaft to the idler gear. Extremely high operating speeds mean the rotors must be straight. Wearability is an absolute necessity if the rotors are to stand up under severe operating conditions.

STRESSPROOF has all of these qualities. In addition, it is readily machinable. Its in-the-bar strength eliminates heat treating with its distortion, cleaning and subsequent machining problems. No rough machining, heat treating and finish machining with STRESSPROOF. The rotors are finish-machined from the bar.

STRESSPROOF's minimum warpage eliminates all straightening operations in this case. Its wearability keeps the rotor running year after year. It also provides real savings in both material and manufacturing costs.

STRESSPROOF makes a better part at a lower cost.

Tuthill Model L Series mechanically sealed pumps are used in lubricating, hydraulic, transfer and burning oil service. Capacities range from ½ to 6 g.p.m. at pressures up to 600 p.s.i. The rotors for these dependable industrial pumps are made from La Salle STRESSPROOF.

WRITE TODAY FOR

helpful data bulletin No. 15... "Improve Quality — Cut Costs"

AVAILABLE FROM LEADING STEEL DISTRIBUTORS COAST-TO-COAST

La Salle STEEL CO.

1438 150th Street, Hammond, Indiana

MANUFACTURERS OF AMERICA'S MOST COMPLETE LINE OF QUALITY COLD-FINISHED STEEL BARS

NEWS OF THE MACHINERY INDUSTRIES

(*Continued from page* 104)

0.032 in. thick. The use of higher pressures, longer peening intervals, and larger shot sizes probably would result in comparable bending of thicker samples.

It was found that the largest deflections were accompanied by greatest surface porosity. Furthermore, finer shot sizes result in finer surface finish for any deflection.

Gear Grinding Expands

To implement its Machine Tool Division for capacity to produce its new single spindle screw machine, the Gear Grinding Machine Co., Detroit, has constructed an addition to its Christopher plant. The new building provides a 33 per cent increase in floor space at this plant. These additional manufacturing facilities will also provide adequate production for both screw machines and gear grinding machines.

Merchant Honored

Dr. M. Eugene Merchant, assistant director of research, Cincinnati Milling Machine Co., Cincinnati, was the recipient of the Sixth Annual Outstanding Engineer Award presented by the Technical and Scientific Societies Council of Cincinnati at their 20th annual joint meeting. The Council recognized the advancements in scientific knowledge of benefits to industry achieved through Dr. Merchant's original research in friction, lubrication, and metal cutting.

Hartford Buys Rockwell Line

Last month the Hartford Special Machinery Co. took over the manufacturing, sales and servicing of the line of Rockwell (Delta-Milwaukee) hydraulic drill units from Rockwell Manufacturing Co., Pittsburgh. The tools will be made in Hartford Special's new Simsbury, Conn., plant. Special equipment is being transferred to the plant from Pittsburgh. Key personnel from sales, engineering and production will be retained and will relocate in the Hartford area.

Gears Climb

It is reported by the American Gear Manufacturers Association that shipments in the gearing industry have increased almost 5½ per cent in February as compared with January of this year. The index figure for February is 148.5 (1947 - 49 - 100).

Passenger Car Body Width

(*Continued from page* 65)

In Column C we have calculated half the difference between overall width and shoulder room. This figure then represents the actual distance in inches, from the point at which shoulder room is taken, to the extreme edge of sheet metal on the exterior. It also represents a measure of the amount of space left to the stylist and body engineer who may be seeking additional shoulder width.

Obviously, any further utilization of this air space would imply a change in contour of the body in transverse cross-section, thus encroaching upon the domain of the stylist.

Looking at the tabulation, one is struck by the enormous gain that has been made by all passenger car builders in utilizing body width to the best advantage. For example, among the highest priced cars dimension "C" ranges from 10.1 in. on Lincoln to 11.25 in. on Packard. Lowest values are 7.5 in. on Willys, and 7.95 in. on Studebaker. Curiously enough, Dodge, Hudson, Nash, and Plymouth are exactly on a par with a dimension of 8.35 in.

It may be noted at this point that the cars in the tabulation have been arranged in ascending order of values of "C" rather than alphabetically, to afford a better comparison by the reader.

The gains made this year in improving the utilization of body width for passenger room are so significant that no further comment seems to be needed unless body profiles are changed much more radically in the future.

NEW PLANT EQUIPMENT

(*Continued from page* 87)

Stand-Up Truck

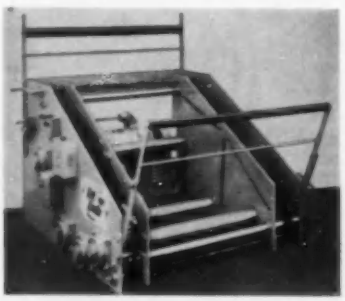
This new stand-up Fork truck allows the use of two batteries placed on either side of the operator, without sacrificing mobility and with an increase in performance. A foot switch with two speeds forward and two speeds reverse and equipped with a dead-man brake, gives one-foot control operation and automatic braking. The storage batteries, either 12-volt units connected in parallel for independent or simultaneous use, or six-volt units connected in series provide up to 800 amp-hr capacity. Dimensions are 31 in. or 42 in. in width and 58¾ in. in length, not including forks, and with a turning radius of 52 in. *Market Forge Co.*

Circle 99 on postcard for more data

Holds Heavy Coils

One of the largest built by this firm, the 7000-lb Koil Kradle accommodates coil stock up to 42 in. in diameter and 40 in. wide. It will automatically operate intermittently by means of its vari-loop control, or continuously at a selected speed. Hand cranked guide plates have hardened rolls to reduce side friction. *Benchmaster Mfg. Co.*

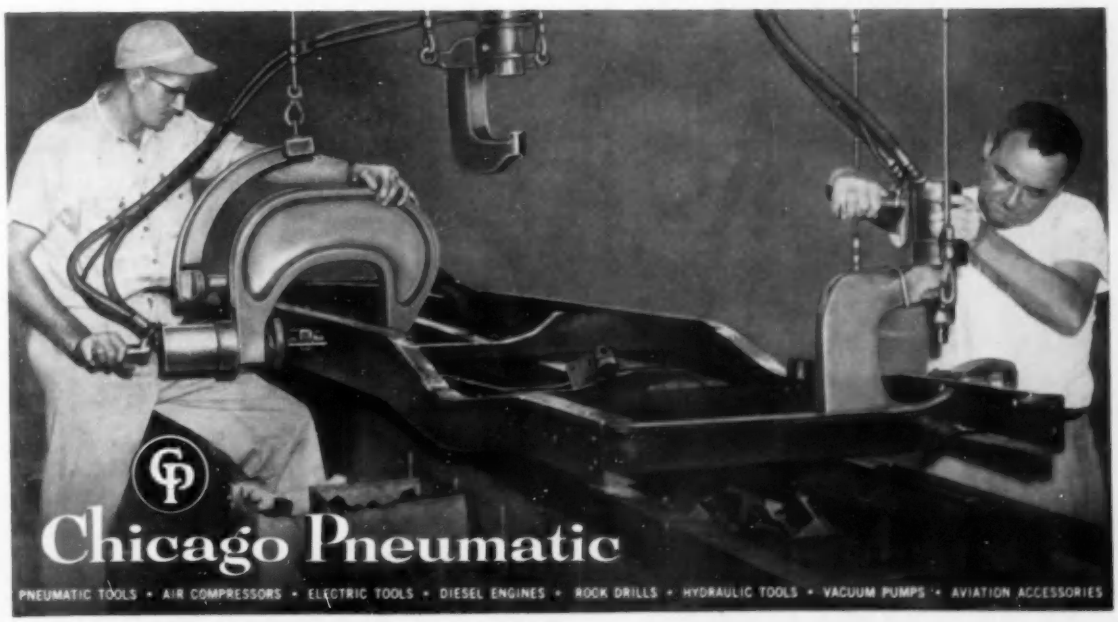
Circle 100 on postcard for more data



CP cold riveting tools put the squeeze on assembly costs

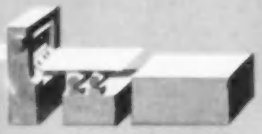
This truck frame job is a good example of CP Hydraulic Tools teamed up to afford maximum efficiency and economy. Light and compact for easy handling by operators, the CP Hydraulic Punch at left exerts 25-tons of pressure to punch holes for running board brackets, while the compact 18-ton Hydraulic Riveter at right speedily drives the ⅜" cold rivets home! With CP Cold Riveting tools there's no heating or "bucking-up" needed. Large tonnage capacity and accurate pressure control afford simple one-man operation.

And more! Operators need no special training to handle CP Hydraulic Riveting equipment. Because of their noiseless operating qualities, operators and workers in the immediate vicinity work without distraction . . . get more done with less on-the-job fatigue. Write *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*



problem...HOW TO CUT STEEL COSTS

Both systems begin with mill coil. However, if you are now buying sheet you are faced with the following costs.



For mill cutting to random lengths, simply shearing to reach sheet form, add **$.20** per hundred weight to basic steel cost.

For squaring to tolerance at the mill add another **10 percent** to your basic steel costs.

Then for wrapping and palletizing to keep the sheet clean and easy to warehouse **add an additional $.025** to the costs.

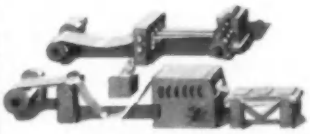
The steel, of course, must be delivered regardless of form.

solution...A WEAN SLITTING and SHEARING

With the Wean system you buy coils, simply prepared . . . eliminate mill extras. Delivery is of comparatively few width sizes.

The fewer sizes . . . the smaller purchasing and inventory staffs required.

And you save approximately 30 percent in storage area.



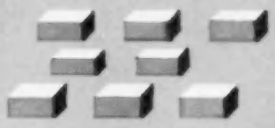
The Wean Line converts the coil of steel to resquared multiples at rates up to 200 feet (or 100 cuts) per minute. Tolerance control is easily held within accepted

Actual Savings in Steel Costs of 20%

To many steel fabricating people this amazing speed of cutting-to-length to resquared tolerances has seemed unbelievable. But, to many others, who have seen one of these Wean lines in operation, talked with people who operate them, gone over actual figures, this is a production line "must".

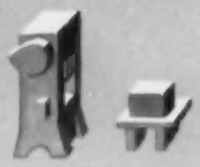
When we say savings up to 20 percent in your steel costs we mean just that. Total up the costs approximated above . . . check them against the book . . . against your own cost sheets. Find out what you're paying for getting steel from coil to final sheet size, ready to form. If it's more than a dime a hundred weight then you should know all about the Wean line. Get in touch with one of the offices listed below and let a qualified Wean representative work with you — using your figures if you wish — in proving the Wean line can effect a substantial savings where you and your operations are concerned.

Where you're buying sheets of various sizes you'll require about **30 percent more help** in your purchasing and inventory control departments.



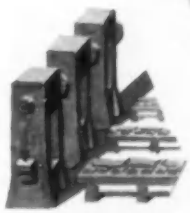
And about **30 percent more space** in your warehousing set-up.

Then, if you further resquare to multiples in your own plant you're paying an **additional cost of at least $.35 per hundred weight.**



Thus, prior to fabrication, you have added approximately $1.10 to every hundred pounds of steel, even though you are using plain light gauge metal.

LINE



range. *The entire "extra" cost prior to fabrication here . . . just a fraction of the $1.00 plus per hundred weight cost of standard methods.*

Wean

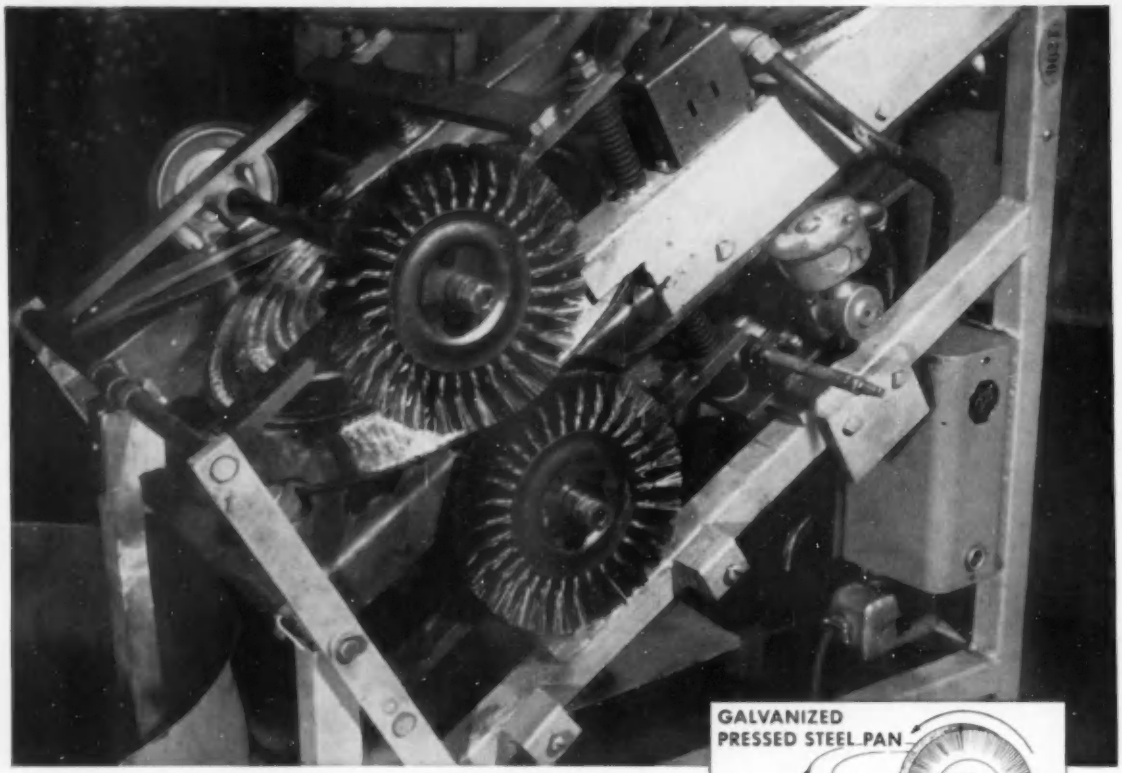
COMBINATION SLITTING and SHEARING SYSTEMS

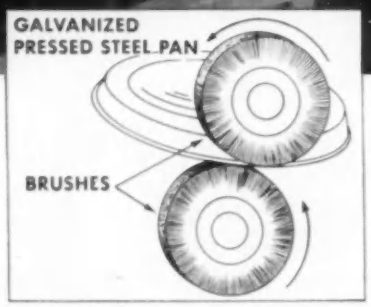
WEAN EQUIPMENT CORPORATION OFFICES

CLEVELAND

CHICAGO NEWARK, N. J. DETROIT

Cable Address: WEANCOR





10-second brush-off removes excess coating

Let an OBA help solve your production problems

A touch of ingenuity and Osborn Power Brushing. That's all it takes to remove hard drips of zinc from these galvanized steel pans.

After pans are dipped for galvanizing, the operator merely drops them in place on this machine. Two Osborn Disc-Center Brushes spin the pans, brush the spelter from the edges. In 10 seconds—all the time it takes for brushing, pans are ejected automatically.

Does this idea suggest an answer to a problem you have? An **O**sborn **B**rushing **A**nalysis can show you where power brushing will help speed production, improve product quality. Call or write *The Osborn Manufacturing Company, Dept. E-28, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

ENGINEERING HELP. *When an Osborn Brushing Specialist makes an* **OBA** *in your plant, he'll study your cleaning, finishing and burr removal operations . . . show where you can cut costs, boost product quality.*

Osborn Brushes

OSBORN

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES


MOULDINGS of
Superior Stainless
strip steel
for
hundreds of
industrial
and
commercial
applications
Here's *usable beauty* for exacting service . . . wear-resistant, hard, bright and strong throughout! SUPERIOR STAINLESS forms smoothly and easily because it is uniform in every physical quality: facts proved by the mile in mouldings manufacture every day. • May we serve *your* stainless steel strip applications?
Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

Dodge Trucks for '55

(*Continued from page* 71)

valves; Stellite-faced exhaust valve inserts; Roto-Cap exhaust valve rotators, and hardenable iron valve guides.

As indicated, the V-8 for V models is basically the same 331.1 cu in. displacement engine, with the same design features. The increase in output is obtained by the use of two carburetors; individual intake manifolds; and two exhaust systems with separate exhaust pipes, mufflers, and tailpipes. A governor and oil filter are standard equipment on both engines.

Where governors are used, the recommended governed speed for all V-8's is 3900 rpm.

All V-8 engines will operate on regular grade fuels.

Solenoid-actuated type starters with key switch control are standard for V-8's, for six-cylinder Forward Control models, and for all right hand drive models.

Twelve-volt ignition is available as extra equipment on all R, T, and V models. Resistor type spark plugs and weatherproofed ignition system are used on all engines. Incidentally, a twin exhaust system is used on certain models in conjunction with the larger output V-8 engines.

While manual shift transmissions are continued without change, Dodge has added a new three-speed heavy duty remote shift transmission as extra equipment for Forward Control models.

In addition, two automatic transmissions and a new overdrive are available as extra equipment, overdrive being offered in conjunction with the standard three-speed transmission for ½-ton models.

The two-speed PowerFlite automatic transmission is available on ½-, ¾- and 1-ton conventional and Forward Control models. The new heavy duty three-speed automatic transmission, called the Super Truck-O-Matic, is offered only with six-cylinder engines for Models F, G, and FN. When used in conventional models, this transmission must not be used in tractor-trailer service.

The Super Truck-O-Matic unit combines a torque converter with a starting torque ratio of 2.16:1, and a three-speed planetary gearbox with forward ratios of 2.308, 1.435 and 1.00 and a reverse ratio of 2.009.

One of the outstanding features of this unit is the solid drive in direct gear, the torque converter with locked gearbox in direct drive, preventing slip and heat loss, thereby increasing the efficiency; also it reduces overrun of the engine in direct gear, and makes downhill engine braking fully effective, as the reverse torque is delivered 100 per cent to the engine.

The transmission shifts automatically and progressively from low gear to second gear to high gear, with corresponding down shifts, and without releasing the accelerator pedal. The shifts are said to be smooth and within a wide range are responsive to the operators desires.

The kickdown at the drivers option from direct to second gear is accomplished by pressing the accelerator pedal beyond the full throttle position. A detent is used to mark this position and it is necessary to press through the detent to get the kickdown.

By placing the selector lever in low (L) position, the transmission is locked in low gear for heavy pulling

114

or for engine braking in down grades.

Because the low and reverse positions are adjacent to each other in the shift pattern the vehicle can be rocked between low and reverse very easily to extricate it from mud or snow.

A linkage booster type hydraulic power steering gear is available as extra equipment for all models 1½-ton through 4-ton.

Front axle ratings have been increased on models from ½-ton through 2½-ton. Rear axle ratings have been upped on 1-ton, 2½-ton, and 4-ton models. Timken H-120 and H-320 rear axles with 16,500-lb ratings are available for the 2¾-ton model to meet maximum GVW ratings. Two-speed rear axles are available on all models from 1½-ton G through the 4-ton ratings.

A special extra equipment package is offered on 4-ton models. It includes a new 11,000-lb rating front axle with larger brakes, heavy-duty springs, frame reinforcements. Power steering and air brakes also are required with this package.

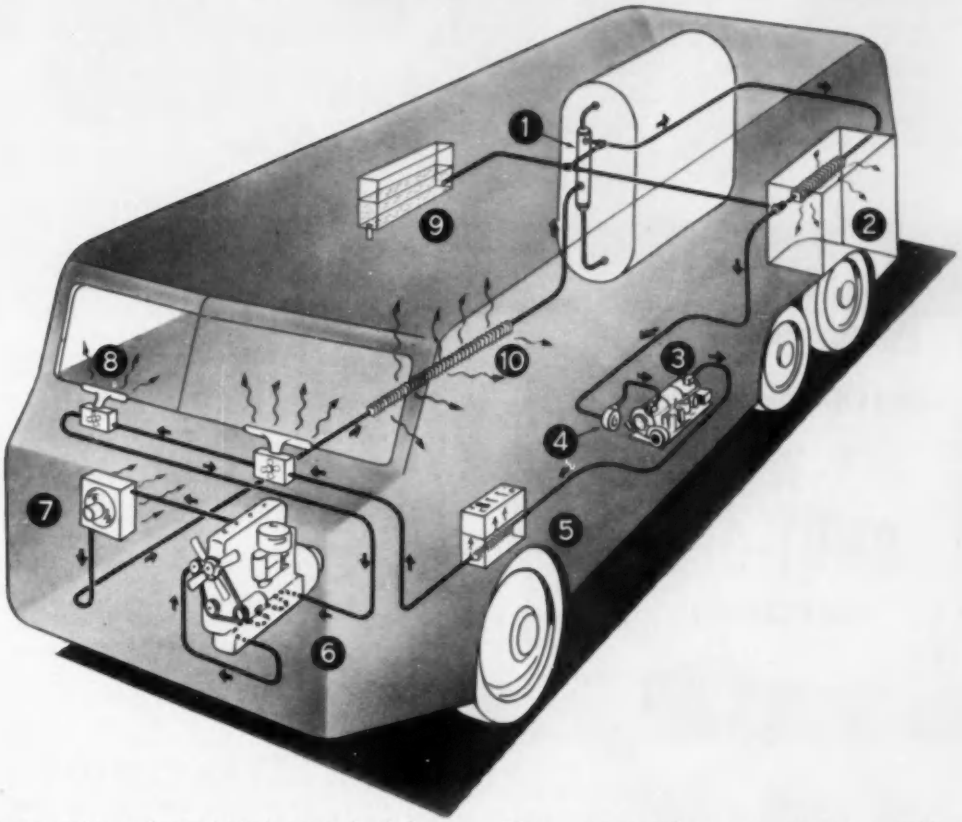
Vacuum brake boosters are available on all models from 1-ton up. A new 7½-in. diameter vacuum brake booster is offered as extra equipment for 1-ton models.

BOOKS . . .

MACHINE OPERATIONS AND SET-UPS, *by Harold W. Porter, Clark H. Lawshe, and Orville D. Lasco, published by American Technical Society, 848 E. 58th St., Chicago 37, Ill. Price, $5.50.* Industry and education, plus the utilization of a national survey, produced this book. It is designed to meet the specific requirements of modern instruction in machine shop techniques. The authors, guided by the results of the survey, have incorporated new widely-used operations into this text, and have repudiated the practice of useless repetition of out-of-date practices. Readers will see the demand for greater emphasis on operations and setups brought skillfully and comprehensively to fruition, with specially prepared illustrations to show the operations, safety measures, and modern equipment in ultra-clear detail. The book gains further significance in its top-grade treatment of grinding operations.

THE GYROSCOPE APPLIED, *by K. I. T. Richardson, published by Philosophical Library, Inc., 15 E. 40th St., New York 16, N. Y. Price, $15.00.* A few years ago the gyroscope was comparatively unknown. Today, the gyroscope plays an important part in the navigation and control of ships and aircraft, in gunfire control, bomb sights, and the torpedo. Thus, there has grown up in recent years a major section of the engineering industry specializing in the design and manufacture of gyroscopic equipment which is being extended still further as the guided missile is developed, perhaps leading eventually to inter-planetary flight.

HOW TO KEEP VEHICLES "hot on the trail"



1. *Liquid-to-liquid heat exchanger for fuels, water, chemicals that might freeze.*
2. *Heat exchangers in special compartments.*
3. *Heart of the system — Janitrol Liquid Heater.*
4. *Liquid circulating pump.*
5. *Heat exchanger in battery compartment.*
6. *Circulation of heated liquid through crankcase and water jackets of engine. (Preheating, standby and maintenance of temperature throughout heating system.)*
7. *Liquid-to-air heat transfer for personnel comfort — cab heating.*
8. *Liquid-to-air heat exchanger coils for defrosting.*
9. *Surge tank. Vent lines from high points in system connect to surge tank.*
10. *Exchanger for cargo, passenger or miscellaneous heating requirements.*

First — and most important — toss your problem into a competent lap! And that means call in Janitrol. Janitrol's experience in applying *liquid* heaters to vehicle heating problems is the culmination of thousands of successful installations on military and commercial vehicles *in operation* all over the world.

The composite drawing illustrates typical elements of Janitrol vehicle heating systems. Any or all of these needs are met by dependable Janitrol Liquid Heaters—regardless of the weather outside.

But remember the first point, and get in touch with Janitrol preferably during vehicle design stage. And for best results on existing vehicles, Janitrol does the job easier with runs of tubing, and compact heat exchangers.

HEAT WHEREVER YOU WANT IT

Janitrol®

AIRCRAFT-AUTOMOTIVE DIVISION, SURFACE COMBUSTION CORP., COLUMBUS 16, OHIO

National Sales, Engineering, Production Headquarters, 400 Dublin Ave., Columbus 16, Ohio. District Engineering Offices: New York, 225 Broadway; Washington, D. C., 4650 East-West Highway; Kansas City, 2201 Grand Ave.; Ft. Worth, 2509 West Berry St.; Hollywood, Calif., 7046 Hollywood Blvd.; Columbus, Ohio, 400 Dublin Ave. Executive Offices: 2375 Derr St., Toledo 1, Ohio.

More Government Contract Awards

THIS latest list of Government prime contracts that have been awarded covers the period from February 23 to March 21, 1955. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, airplanes, automotive components and spare parts, automotive maintenance equipment, etc.

ACCURATE PARTS MANUFACTURING CO., Chicago, Ill.
Machine clutch rebuilder, universal type, automobile and truck; floor mounted—99 ea.—$49,752

AIRCOOLED MOTORS, INC., Syracuse, New York
Special tools—$30,000

AVCO MANUFACTURING CORP., Lycoming Div., Stratford, Conn.
Special tools—66—$1,835,700
R-1820-84 engine—115—$3,365,690

Spare parts—415 ea.—$808,550

THE BAKER-RAULING CO., Cleveland, Ohio
Rebuilding of explosion-proof fork lift truck—79—$323,110

BARBER-COLMAN COMPANY, Rockford, Ill.
Actuators, engineering data, maintenance data PR—$161,183

BARRETT EQUIPMENT COMPANY, St. Louis, Missouri
Brake shoe bonder and de-bonder vehicle lining type—259 ea.—$121,822

BEECH AIRCRAFT CORP., Wichita, Kansas
Propeller assy.—39—$54,748

BENDIX AVIATION CORP., Bendix Products Div., South Bend, Ind.
Brake assy.—1086—$656,066
Carburetors—51 ea.—$65,626
Brake assembly—1159—$3,522,476

BENDIX AVIATION CORP., Eclipse-Pioneer Div., Teterboro, N. J.
Indicator—$643,791

BENDIX AVIATION CORP., Utica Div., Utica, New York
Pump assys.—Various—$281,345
Pump-air-assys.—473 ea.—$182,559

BOEING AIRPLANE CO., Seattle, Washington
Gas turbine engines and accessories—12—$719,983

BORG-WARNER CORP., Rockford Clutch Div., Rockford, Ill.
Kit, repair, clutch plate disk assy., clutch—Various—$219,978

BUNKE-MUSSER, INC., Jackson Center, Ohio
Trailer, engine and shelter heater, 2-wheel—2126 ea.—$280,491

CHRYSLER CORP., Detroit, Michigan
Spare parts for mount, combination, 120MM for tank M43—$311,140
Medium tank, M48 with spare parts; tanks T-43 with spart parts, facilities and engineering services—$194,282

CHRYSLER CORP., Engineering Div., Detroit, Mich.
Tank, 90MM T48E2—4—$750,000

CONTINENTAL AVIATION & ENGINEERING CORP., Detroit, Mich.
Engines—18—$375,206
Starter generators—18
Overhaul of MA-1 gas turbine compressors and components—$237,500

CONTINENTAL MOTORS CORP., Muskegon, Michigan
Spare parts—357 ea.—$33,169
O-470-13B airc engines special tools and ground handling equipment—149—$476,140

CURTISS-WRIGHT CORP., Carlstadt, New Jersey
Flight simulator trainer, spare parts, special tools and ground handling equipment—$450,000

CURTISS-WRIGHT CORP., Propeller Div., Caldwell, New Jersey
Prop assys.—268—$15,971,353

DETROIT DIESEL ENGINE CORP., Detroit, Mich.
Generator sets—37—$574,854

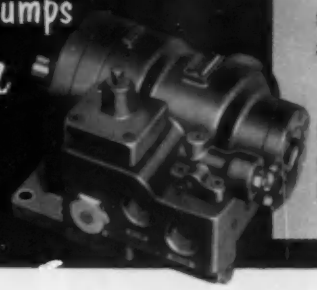
DOUGLAS AIRCRAFT CO., Long Beach, Calif.
Facilities for engineering flight test—$2,200,000

(*Turn to page 118, please*)

Do You Want To Save Horsepower and Heat?

VICKERS

Two-Pressure Oil Hydraulic Pumps Require Less Power for Two-Pressure Circuits



Automatically Provide

High Volume @ Low Pressure for fast closing, rapid advance, and rapid return.

•

Low Volume @ High Pressure for feeding, compressing, clamping, and holding.

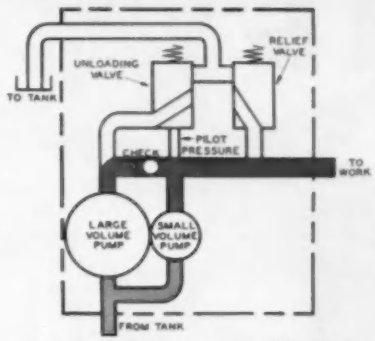


Fig. 1 Combined Delivery of Large and Small Volume Cartridges at Low Pressure

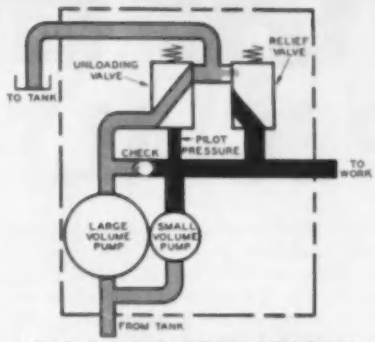


Fig. 2 Delivering Small Volume at High Pressure

Two Vickers Vane Type pumping cartridges are mounted on the same shaft—in the same housing, driven by the same prime mover. One provides a large volume of oil while the other delivers a small volume. These Vickers Two-Pressure Pumps have proved advantageous in a wide variety of applications.

For example, in closing a press or in rapid advance, both pump cartridges work together, supplying maximum volume for quick operation (see Fig. 1). When the press is closed and compression begins, or when the tool goes into feed immediately prior to beginning the cut, the large volume cartridge is automatically unloaded to the reservoir at zero pressure (see Fig. 2). The small volume cartridge alone then provides the lower volume required at high pressure.

These Vickers Two-Pressure Pumps are most economical in power consumption for such two-pressure operation. The reason for this is that a small-volume pump working at full capacity is MORE EFFICIENT than a large-volume pump working at partial capacity. Regardless of momentary delivery, the internal leakage of any pump is proportional to its size and operating pressure. The chart (Fig. 3) shows an interesting comparison between a Vickers Two-Pressure (Two-Volume) Pump and a variable volume vane type pump on a press circuit.

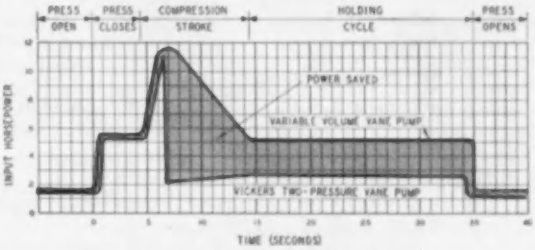


Fig. 3. On this typical press application the saving in power is approximately 50% with a resultant saving in heat in the system.

Like all Vickers Vane Pumps, these two-pressure pumps have the hydraulic balance feature that relieves bearings of all pressure loads (one of the major causes of wear). Cartridge construction enables customer to service in his own plant instead of returning to factory should repairs be necessary. Relief and unloading valves are integral . . . minimizing piping and connections. Complete range of sizes up to 48 gpm. For additional information, ask for Bulletin 54-70a.

6895

VICKERS Incorporated
DIVISION OF SPERRY CORPORATION
1428 OAKMAN BLVD. • DETROIT 32, MICH.

Application Engineering Offices • ATLANTA • CHICAGO AREA (Brookfield) • CINCINNATI • CLEVELAND • DETROIT HOUSTON • LOS ANGELES AREA (El Segundo) • MINNEAPOLIS NEW YORK AREA (Summit, N. J.) • PHILADELPHIA AREA (Media) PITTSBURGH AREA (Mt. Lebanon) • ROCHESTER • ROCKFORD SAN FRANCISCO AREA (Berkeley) • SEATTLE • ST. LOUIS • TULSA WASHINGTON • WORCESTER

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

(*Continued from page* 116)

DOUGLAS AIRCRAFT CO., INC., Santa Monica, Calif.
Interior modification—$130,000

THE ELECTRIC AUTO-LITE CO., Toledo, Ohio
Motor vehicle parts—15,000—$47,400

EX-CELL-O CORP., Lima, Ohio
Facilities for compressor wheel assembly —$200,700

FAIRCHILD ENGINE & AIRPLANE CORP., Hagerstown, Md.
Manufacture and installation of ECP kits on C-119F and C-119G type aircraft —780 ea.—$2,854,941

FARGO MOTOR CORP., Washington, D. C.
Trucks—30 ea.—$85,557

FORD MOTOR CO., Ford Div., Livonia, Michigan
Commercial vehicles—86—$153,477

FORD MOTOR CO., Ford Div., Washington, D. C.
Automobiles—170—$226,777

GENERAL ELECTRIC CO., Los Angeles, Calif.
Repair, overhaul and mod. J47-GE-17—772 ea.—$513,796

GENERAL METALS CORP., Adel Div., Burbank, Calif.
Motor assy.—343—$37,810
Fluid metering pump—125

GENERAL MOTORS CORP., AC Spark Plug Div., Flint, Mich.
Maintenance tools and test equipment for K-14C gunsights—$323,406

GENERAL MOTORS CORP., Allison Div., Indianapolis, Ind.
Transmission assembly—161 ea.—$1,368,500
Pinion, transmission, fan and pump—812 ea.—$27,283
Turbo-jet airc engines—69—$1,395,870
Turbo-prop engine—$120,900
Turbo-jet engine—107—$2,186,545

GENERAL MOTORS CORP., Chevrolet Motor Div., Detroit, Mich.
Sedans—8 ea.—$11,157
Commercial vehicles—478—$1,435,499

GENERAL MOTORS CORP., Cleveland Diesel Engine Div., Cleveland, Ohio
Repair parts—173,770—$1,341,528

GENERAL MOTORS CORP., Detroit Diesel Engine Div., Detroit, Mich.
Repair parts—42,344—$164,410

GENERAL MOTORS CORP., FOREIGN DISTRIBUTING DIV., New York, N. Y.
Trucks—7 ea.—$12,332

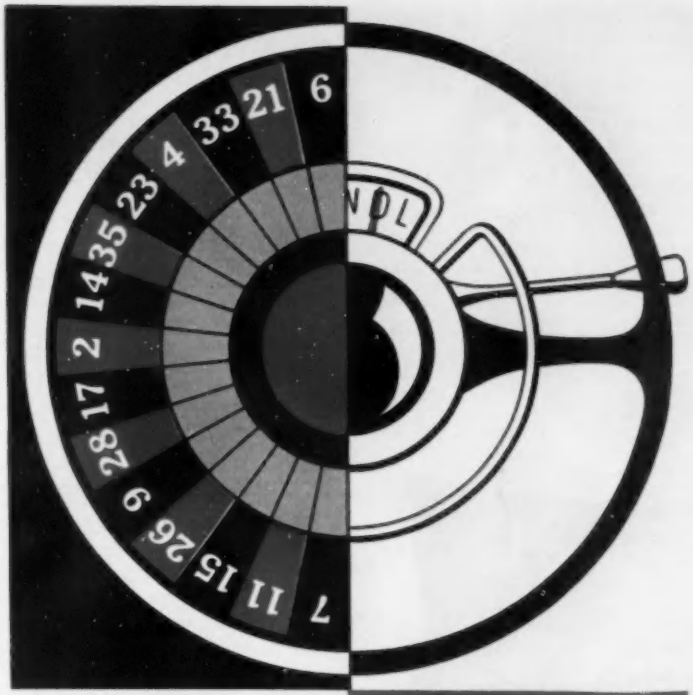
GENERAL MOTORS CORP., GMC Truck & Coach Div., E. Pontiac, Mich.
Trucks—2 ea.—$186,514
Commercial vehicles—11—$54,222

GENERAL MOTORS CORPORATION, Oldsmobile Div., Lansing, Mich.
Guns, 90MM, M41, spare tubes, spare tubes and equipment—5058—$3,459,236

THE GENERAL TIRE & RUBBER CO., Akron, Ohio
Wheel assy.—1090—$42,163

GOODYEAR AIRCRAFT CORP., Akron, Ohio
Facilities for the production of B-61 aero components—$480,000

(*Turn to page* 120, *please*)



which is the greater gamble?

THE ROULETTE WHEEL

THE STEERING WHEEL

The hum of the idling engine gives only the hint of power. He sits behind the wheel. 200 hp. ready to roar into action. The feeling of power is warm . . . exhilarating. His calf muscle tightens. His foot swings down. Instantly, predictably, the engine responds. And with the turn of the wheel . . . he gambles their lives . . . the stakes couldn't be higher.

With a surge of power he moves out of the parking space into traffic. At every stop light, sign or emergency stop he's gambling that his brakes can control all that power.

He's gambling that they won't grab and pitch someone forward . . . won't fade and let the car drift into a cross stream of traffic. He's gambling that the brakes can stop him fast enough . . . often enough . . . without dangerous swerving.

Every day some nice family loses this gamble. Brakes fade or grab, the car swerves or just doesn't stop fast enough.

The greatest single mechanical cause of accidents is brake failure. So why take chances? Better brakes can save lives. Better brakes are here now, ready for cars. They're Auto Specialties Double-Disc Brakes. Double-Disc Brakes automatically keep themselves in adjustment. Don't grab. Don't fade. Stop quicker *at high speeds*. Stop smoother, straighter, quicker, safer . . . *at all speeds*. Auto Specialties Double-Disc Brakes are better brakes.

Auto Specialties Self-Energized Double-Disc Brakes have passed the severe testing of major car factories. Their cost is comparable to that of present automotive brakes. Their adoption will be in keeping with increased horsepower and speed and with the industry's continuing desire to give the American motorist better, safer and more pleasant means of transportation.

For information about these brakes, write for a copy of "THE STOPPING STORY".

AUTO SPECIALTIES MFG. CO., INC.

SAINT JOSEPH, MICHIGAN

Plants also at Benton Harbor and Hartford, Mich., and Windsor, Ont., Canada.
Manufacturing for the automotive and farm machinery industry since 1908.

(*Continued from page* 118)

THE GOODYEAR TIRE & RUBBER CO., INC., Akron, Ohio
Wheel assys.—493—$431,829
Brake assys.—420
Wheel assys.—622 ea.—$122,198

GRAY MARINE MOTOR CO., Detroit, Michigan
Repair parts for Diesel engines—9256—$59,172
50 hp Diesel engine—17—$47,128

HOUDAILLE-HERSHEY CORP., Buffalo, New York
Damper assys.—Various—$61,607
Landing gear spare parts—609 ea.—$53,117

INTERNATIONAL HARVESTER CO., Washington, D. C.
Commercial vehicles—35—$71,384

INTERNATIONAL HARVESTER EXPORT CO., Chicago, Ill.
Trucks—37 ea.—$170,966
Maintenance and replacement of tooling for M-39 series, 5 ton tactical truck—Job—$215,000

KELSEY-HAYES WHEEL CO., Detroit, Michigan
Facilities for the production of compressor spacer tests—$631,400

KIT MANUFACTURING CO., Long Beach, Calif.
House trailers—5 ea.—$27,470

THE LEECE-NEVILLE CO., Cleveland, Ohio
Spare parts for Detroit Diesel marine engine—12,150 ea.—$55,666

McCAULEY INDUSTRIAL CORP., Dayton, Ohio
Propeller assembly—575—$104,650

McDONNELL AIRCRAFT CORP., St. Louis, Missouri
Ground handling equipment—Various—$338,812

MONROE AUTO EQUIPMENT CO., Monroe, Mich.
Shock absorbers—2091—$70,820

NEW YORK AIR BRAKE CO., Dudco Div., New York, N. Y.
Tank spare parts—31,940—$371,539

OSHKOSH MOTOR TRUCK, INC., Oshkosh, Wisconsin
Trucks—3 ea.—$23,100

PACIFIC CAR & FOUNDRY CO., Renton, Washington
Spare parts for T74 tank recovery vehicle—$676,580

PIASECKI HELICOPTER CORP., Morton, Pa.
Services for repair and modification of H-21 wooden rotor blades—228 set—$470,400

RACONY CORP., Reco Products Div., New York, N. Y.
Air conditioner, trailer mounted—787 ea.—$1,444,811

REO MOTORS, INC., Lansing, Michigan
Auto spare parts—31,961—$174,683
Winch and power takeoff kit—144 ea.—$36,985

W. A. RIDDELL CORP., Bucyrus, Ohio
Motor graders, spares—$37,397

SEALED POWERS CORP., Muskegon Heights, Mich.
Automotive spare parts—60,492—$81,724

THE SHEFFIELD CORP., Dayton, Ohio
Gages, Precisionaires—420 ea.—$46,173

THE SIDNEY MACHINE & TOOL CO., Sidney, Ohio
Lathes, copying, heavy duty, floor type—$130,613

A. O. SMITH CORP., Milwaukee, Wisconsin
Air flask—360 ea.—$896,734
Fuel tanks—360 ea.—$896,734

THE SPERRY CORPORATION, Teterboro, New Jersey
Indicator—650—$560,138

STEVENS INSTITUTE OF TECHNOLOGY, Hoboken, New Jersey
Research and development of two stroke turbo-compound Diesel engine—$52,375

STUDEBAKER-PACKARD CORP., South Bend, Indiana
Shaft, front axle output assy.—3445—$236,864

STUDEBAKER-PACKARD CORP., Detroit, Michigan
Twelve cylinder, 600 bhp Diesel engine—14—$611,161

THEW SHOVEL CO., Lorrain, Ohio
Crawler shovels—3 ea.—$76,414

TWIN DISC CLUTCH CO., Racine, Wisconsin
Repair parts for Diesel engines—1660—$178,242

UNITED AIRCRAFT CORP., Hamilton Standard Div., Windsor Locks, Conn.
Propeller assys.—5—$57,860
Control and brush pad—5—

(*Turn to page* 124, *please*)

J&L STEEL

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Kearney & Trecker offers you standard units for special production machine applications

Throughout the metalworking industry there is an ever increasing demand for the automatic production machine that can perform many operations to exacting accuracies. To meet this demand Kearney & Trecker offers you the unusual opportunity to combine standard design units with a minimum of special engineering to accomplish your increased production requirements. This means you get the production you want, the economies you need, from job-proven designs with minimum capital investment.

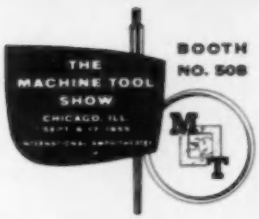
With more than half a century of experience in machine design and manufacturing skill, Kearney & Trecker has the all-around ability to meet your production needs. Take advantage of these abilities. They can pay off in more profits for you. See your Kearney & Trecker Special Machinery Division representative. He'll be pleased to discuss your production requirements and what Kearney & Trecker can do for you.

Builders of Precision and

KEARNEY & TRECKER DESIGNED

A major installation in the Studebaker-Packard Corporation's recent modernization program is this Kearney & Trecker 13-Station, Automatic Transfer machine. It mills, drills, reams, taps, spot faces and saws apart integrally-cast bearing cap blocks at the rate of 73 sets per hour. Once in operation, the machine is completely automatic. Workpieces are unloaded from the previous machine and loaded directly into this machine.

The machine consists of a rigid base and special transfer mechanism with 3 milling units and 6 drilling and tapping units. These units are arranged in a series of 8 machining stations with 3 intermediate idle stations and one station each for loading and unloading. Milling spindles are quill-mounted to provide for axial adjustment.



For more details on the machine illustrated ask for Data Sheet No. 1060. Also, free booklet "Doorway to a proven method for solution of big and small metalworking problems" is yours for the asking.

Production Machine Tools Since 1898

(Continued from page 120)

U. S. THERMO CONTROL CO., Minneapolis, Minnesota
Refrigerator unit gasoline engine driven (panel type) for 7½ ton semi-trailer refrigerator—$209,453
Spare parts and tool set

VICKERS, INC., Detroit, Mich.
Pump assy.—7 items—$411,061

RAY WHYTE ELECTRIC PRODUCTS CO., Detroit, Michigan
Auto spare parts—15,690—$32,007

WILLYS MOTORS, INC., Toledo, Ohio
Trucks—11 ea.—$23,210

L. A. YOUNG SPRING & WIRE CORP., Detroit, Michigan
Shell, HE, M107—220,000—$4,863,200

New Titanium Alloys Disclosed at Conference

(Continued from page 72)

tire production processes, statistical quality control is utilized at every stage of manufacture.

It is of interest that within the past month Mallory-Sharon has put into production two new titanium alloys. According to the company, these alloys are the first major developments in some time. The first of these is the six-aluminum four-vanadium alloy, developed by Armour Research Foundation under contract to Watertown Arsenal Laboratory. Mallory-Sharon worked very closely with Pratt & Whitney Aircraft during the initial production stages. It is stated that this is the first weldable titanium alloy having high notch toughness. It is comparable to high strength steels used in armor plate and weapons. The company used it at temperatures up to 750 F with maximum creep resistance. For the other alloy, Mallory-Sharon used a three manganese complex composed of three per cent manganese, one per cent chromium, one per cent molybdenum, one per cent vanadium, and one per cent iron. This particular metal is heat treatable and is designed for use up to about 500 F and is considered a lightweight replacement for high strength steel. It was developed by Battelle Memorial Institute under Air Force contract.

The remainder of the conference was taken up with several interesting papers. John H. Garrett, chairman on the steering group on titanium research and development, office of assistant secretary of defense research and development, Department of Defense, gave the keynote address. He stated that the Government would like to increase the research program for titanium by $2 million per year for a total outlay of $4½ million a year. According to Mr. Garrett, there is a definite need for better methods and better uniformity in titanium production. He stated that it will be at least five more years before this country will utilize 35,000 tons of titanium per year for aircraft production. Because of this, industry should find other military and commercial uses for this lightweight material beside just aircraft components. Mallory-Sharon has a melting capacity of 1500 tons a year.

It was brought out by Frank H. Vandenburgh, vice president and general manager of Mallory-Sharon, that one airframe company is producing a supersonic jet fighter that utilizes over 700 lb commercially pure and alloy titanium for an aft fuselage section. He went on to say that the military useage of titanium is not restricted to the aircraft industry by

any means. Army equipment such as tank parts, field guns and trails, armor plate and various types of portable equipment have utilized the lightweight and corrosion resistance of titanium. The Navy has found many applications in submarines and mine sweepers. It is felt that there is an unlimited civilian market, but the price will have to be much lower so that it will be economically feasible.

One of the main production problems, according to Burt H. McKibben, chief metallurgist, was that titanium picked up considerable hydrogen during the melting process. With the new Method "S" procedure, Mallory-Sharon has been able to control the amount of hydrogen pickup. Each time that titanium is subject to heat or cleaning, tests for hydrogen content must be made.

The director of research, L. S. Busch, stated that one of the major projects concerning the vacuum melt furnaces is one involving arc stability and control. Closely allied with this problem is the stirring of the melt to improve homogeneity and ingot surface. The research department has four projects continually underway. These involve alloys for jet engine use, alloys for airframe, high strength alloys and miscellaneous alloy research. He stated that if the progress in the next five years is equivalent to that made in the past two years, we can expect some outstanding accomplishments in the titanium field. He named three specific things we may expect.

1. Sheet alloys which can be formed in a soft condition and aged to strengths of 200,000 psi with a weight saving over stainless steel of about 30 per cent.

2. Forging alloys which will compete with high heat treat steel at 280,000 psi ultimate at room temperature with a saving of 40 per cent in weight.

3. High temperature alloys which will have the required creep characteristics at 800 F and possibly at 1000 F.

James A. Roemer, president of Mallory-Sharon, stated that the titanium industry needs new orders primarily for commercial applications, and the industry would like the Government to release more sponge to titanium manufacturers. Mallory - Sharon shipped 1½ times more material in 1954 as compared with 1953, and it is anticipated that this will increase for 1955 provided the military specify titanium for more airframe parts, engine parts, and other defense needs.

(*Turn to page* 130, *please*)

Catching the eye of new car prospects

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GUIDE'S SPRING HIGHWAY CAMPAIGN

A wise and friendly little owl is telling the world about a new world of night driving safety, courtesy and convenience! He's Blinky . . . symbol for GM's Autronic-Eye. And *Blinky means business!* He is on the job in major magazines and now he takes to the open road. You—and more important—your new car customers—will see him this spring on over 3,500 big billboards along every Federal and state highway! Yes, Blinky is on the job . . . so join him in his drive for profitable *plus-business* for you!

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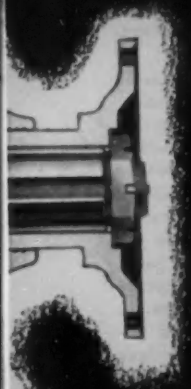
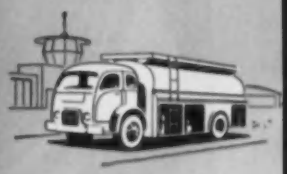




have been built since 1934 for every kind of heavy-duty civilian and military use!

SPICER PRODUCTS: TRANSMISSIONS • UNIVERSAL JOINTS • PROPELLER SHAFTS • AXLES • TORQUE CONVERTERS • GEAR BOXES • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES • STAMPINGS • SPICER and AUBURN CLUTCHES • PARISH FRAMES

TOLEDO 1, OHIO

Spicer

(*Continued from page* 126)

The final paper presented at the conference was delivered by John L. Goldthwaite, critical materials engineer, Allison Div., GMC. He stated that the most important use of titanium for jet engines is in the compressor sections. Giving a theoretical example of the weight saving, he observed that a 720 lb steel rotor for a jet engine compressor section could be replaced with a titanium rotor section which would weigh only 415 lb. Titanium, of course, takes a median temperature range of about 800 F maximum. Aluminum and magnesium are suitable for temperatures up to about 400 F. Steel is generally used in the high temperature range of 1000 F.

AUTOMATION IS THEME at SAE Production Meeting

(*Continued from page* 63)

Quality Control

A new concept was advanced, in the quality control forum, of marking engineering drawings with symbols for the degree of inspection and the importance of various parts. It was stated that there is a demand for, and a trend to, inspection by machine —before, during, and after machining processes. The whole object is, don't control production, control the process!

According to personnel representing the selection of materials panel, there is a trend from alloy steels to carbon steels in order to cut cost. This trend has been made possible due to better heat treating methods. It also enables a manufacturer to cut down on the number of different steels usually purchased.

The major fact brought out during the session on the control of manufacturing cost was on estimating cost when placing an item in production. It was felt as though a great deal of historical data should be available for this purpose and trained accountants should work on the program.

It was suggested during the panel on engineering and manufacturing coordination, that representatives from production, planning, and engineering should go over new designs before they are placed in production. Members agreed that the shop should be well acquainted with the part it is to produce during the early design stages. Tolerances should be kept to a workable standard and a constant check should be kept with the shop on whether or not close tolerances can be economically produced.

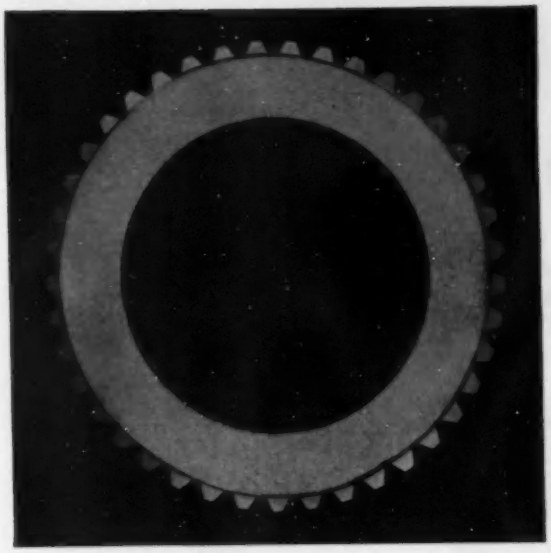
Abstracts of two papers presented at the Production Meeting follow:

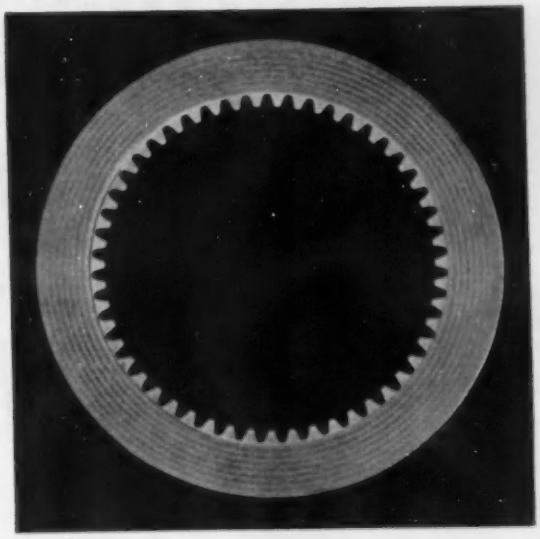
Needed— Automation Principles

By E. H. Kelley and J. T. Buckmaster

Chevrolet Motor Div., GMC

"Automation" is merely a new word applied to continuing technological progress which has not only substituted mechanical power for human drudgery but also has been a prime





Clutch plates for modern automatic transmissions incorporate semi-metallic facings (above) or non-metallic facings (right), according to manufacturers' specifications.

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automatic transmissions . . .

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The range of Moraine friction material formulas is almost limitless. And whether your need is for parts incorporating all-metallic, semi-metallic, or non-metallic friction materials, you can expect more from Moraine . . . because Moraine friction materials meet all the requirements of the application . . . provide superior resistance to heat, wear, and corrosion.

With a long record of performance in Hydra-Matic, Powerglide, and Dynaflow automatic transmissions, Moraine friction materials are finding new uses in heavy-duty truck transmissions, in special military vehicles and equipment, in automotive air conditioning, and in household appliances.

Perhaps Moraine's experience and special abilities with friction materials can be of help to you.

Other Moraine products include: Moraine-400 bearings, toughest automotive engine bearings ever made—M-100 engine bearings and Moraine conventional bi-metal engine bearings—Self-lubricating bearings—Moraine metal powder parts—Moraine porous metal parts—Moraine rolled bronze and bi-metal bushings—Moraine power brakes—Delco hydraulic brake fluids, Delco brake assemblies, master cylinders, wheel cylinders and parts.

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DIVISION OF GENERAL MOTORS, DAYTON, OHIO

factor in raising our standard of living. It began with the invention of the wheel and has continued ever since. We engineers understand and appreciate this fact. But unfortunately, many other people are being deliberately confused by current publicity under the label "automation."

There is an abundance of literature blithely extolling the merits, and the glories if you will, of automation; reams of literature heralding amazing installations to come, and fantastic prophecies from those who distort facts to sell their product.

Design engineers bear the responsibility for initiating this necessary group collaboration. They have the knowledge not only of what they are presently designing, but to a great extent, certain probable future design changes—therefore, the primary responsibility for initiating this urgently needed collaboration program rests squarely on the design engineers. But if the design engineers shirk this responsibility; that is pre-eminently theirs, then some other group—and perhaps it would be the production engineers—will have to do their job for them.

The master mechanic engineer, and the machine design engineer need not necessarily wait for the product design engineer to initiate the needed group collaboration program. There are certain basic production propositions that the master mechanic and equipment design engineers can and should follow in the interim.

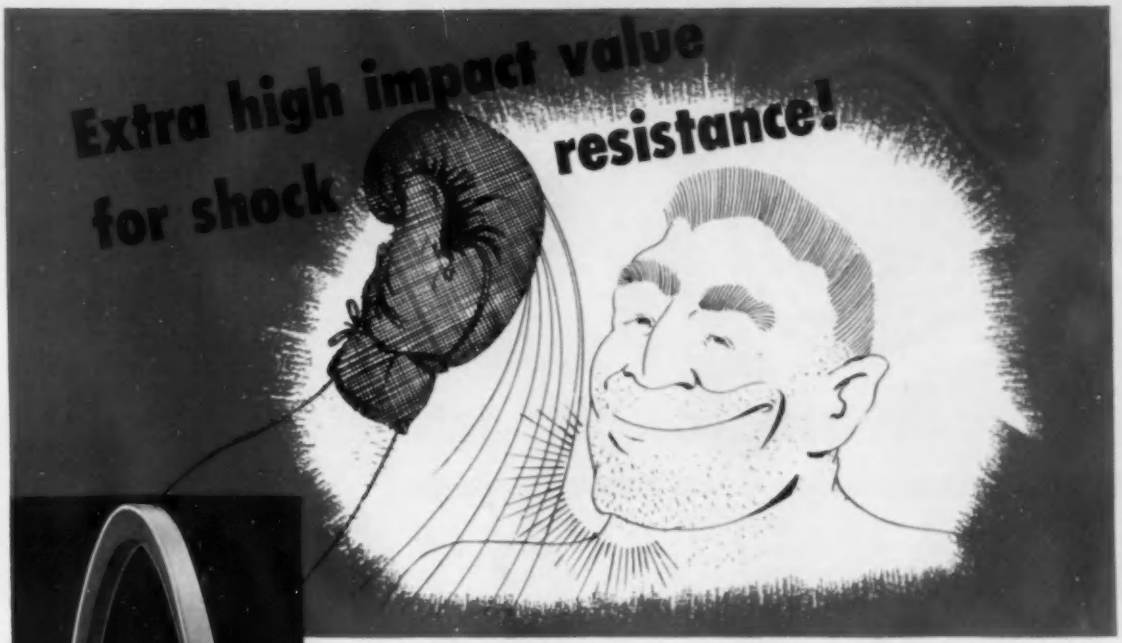
Based on industry's accumulated experience in achieving its present level of technological progress, these economic and production propositions must be kept constantly in mind:

1. Any new process or equipment, call it what you will, should provide maximum protection against what has been termed the minimum hazard principle in production. Therefore, operation sequences shall be combined and set up in a matched and balanced manner so that the least hazard of machine interferences will result.

2. Such installations should provide for extension of the "module" idea to its greatest economic effectiveness. So, the sequence of operations should be set up to provide maximum utilization of basic standardized units of machinery and tooling.

3. The installation should facilitate straight line flows of material with maximum production line compactness.

4. The installation should further provide retention of control of the product material from the earliest point in the process to the final, or



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- Cyclan has extra high impact value for resisting shock.
- Cyclan combines the wearing quality of cast iron with the strength of steel.
- developed by Sealed Power metallurgists and exclusive with Sealed Power.
- outperforms any ring in the top groove
- available with or without chrome facing.

AMONG CYCLAN'S MANY ADVANTAGES...

- Cyclan retains the bearing characteristics of cast iron.
- Cyclan rings retain their true shape even after considerable deflection.
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to the nearest final stage of completion of the process.

5. Adequate provision for continuity of line operation in the event of intermediate station failure.

6. Provision for production not only of current and anticipated future design but also ample clearance for other tooling to accommodate interchangeability and past model service requirements.

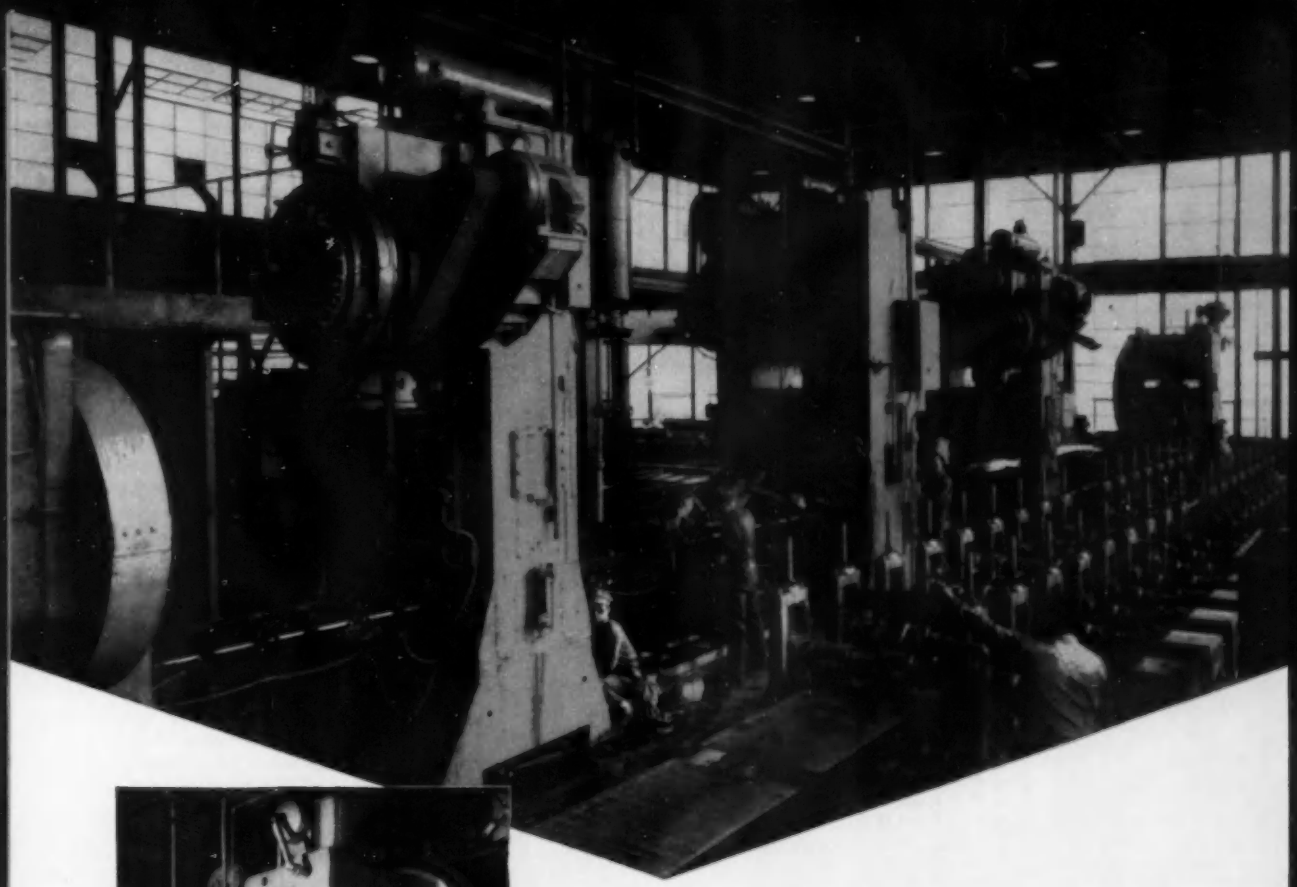
It is no longer sufficient that product drawings portray only the current design change. It is essential that the master mechanic engineer have, in addition to the current design drawing, what is of equal or greater importance, namely, drawings which show in phantom outline the anticipated or probable future design expectations. Only with this phantom or similar technique will it be possible for the master mechanic engineer to convey to the facility design engineer, the flexibility that must necessarily be provided in the proposed facility. Only then can management have a reasonable degree of confidence in assuming that the capital risk involved in the acquisition of new facilities has substantial justification. Only then can management be assured that next year (or maybe next month), a necessary or desirable design change can be incorporated in the product without incurring heavy financial penalty. This responsibility definitely lies with the product design group—they can no longer shirk the heavy penalty for their failure in this important obligation to their managements. Therefore, let me say again in the plainest language, unless the product design group follows these basic principles which provide this vitally needed guidance to management, they are derelict in their duty.

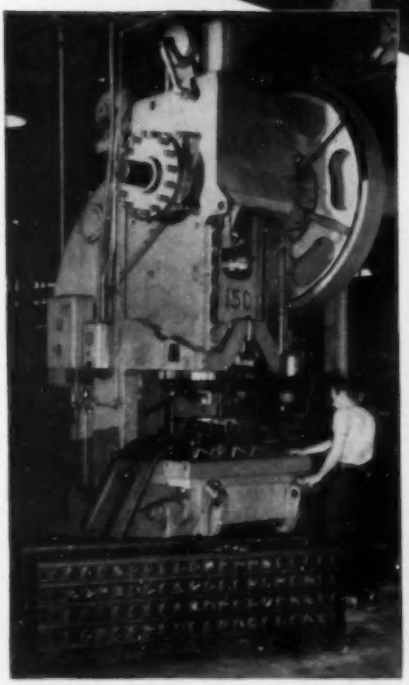
It is of prime importance that adequate provision be made for close collaboration between the design engineer, the market research engineer, the sales research engineer, the production engineer, the accountants and others in the firm who in the past may not have been consulted to the extent that is now necessary. It is obviously necessary that the master mechanic engineer have knowledge not only of the current product change, but of equal and often of more importance, he must have knowledge of the anticipated product change before proceeding on his facility design and procurement program. The design engineer must also have the benefit of the counsel or recommendations of the research engineer, the sales engineer and members of management responsible for the major decisions involved in the development and acquisition of new equipment. These basic requirements now demand constant and intimate collaboration between the product-design engineer and the sales research group in order to form the foundation for any economically safe and intelligent approach to future technological progress.

Proper Materials Management Saves $

By Joseph Gurski
Ford Motor Co.

Responsibility for effecting the most efficient utilization of materials lies in the two broad areas of product engineering and manufacturing. Product engineering is vitally concerned with adequate designs so that the part will do the required job. Product engineers must be aware of latest manufacturing techniques to take advantage of reduced processing costs in





Chevron shaped mat fasteners are produced from ¼" steel on this 150 ton Clearing inclinable press.

OPERATION AIRSTRIP

Clearing Presses Mass Produce Landing Mat Sections

If you're looking for an example of modern mass production, take the job being done by Mesker Bros., Inc. in St. Louis. At peak operation Mesker runs 300 tons of steel a day through their plant in the production of landing mat sections. The operation is performed with economy of handling and speed that takes full advantage of the working capacity of their line of Clearing presses.

If you have a problem concerning press metalforming, call on Clearing engineers for a solution that will gear your production up to its top potential.

CLEARING PRESSES THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION DIVISION OF U. S. INDUSTRIES, INC.

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their designs. The part that manufacturing plays is varied and ranges from purchasing, handling and processing to standardization, salvage and repair.

As a result of the more complicated parts we have today and the importance that is placed on processing costs, with resulting automation and more complicated machines, the problem of planning and timing assumes greater importance. This is typified by the illustration that for our 1955 models orders were placed for transmissions, engines, rear axles, major stamping dies, bumper impact bars and die castings at 23, 17, 16, 14, 11 and 7 months respectively ahead of introduction.

In view of the necessity of releasing new designs considerably ahead of production deadlines and the obviously desirable goal of releasing designs which are correct in all respects and require no changing or deviation during the life of the model, it would appear that the following basic operating principle for product engineering drawings would be desirable:

"Allow manufacturing all possible freedom in selecting materials and processes consistent with production of parts satisfying end product requirements."

In industry, with the ever increasing squeeze between costs of production and prices that the consumer is willing to pay for the product, standardization and simplification are two of the few ways left to reduce costs of doing business. To ignore the possibility of savings by these means is unthinkable to anyone who has seen what can be done. While savings through standardization and simplification may not be as spectacular as the savings that can be achieved in materials handling or radically new processing or new materials, they are still extremely important.

Many activities at Ford have benefitted from this simplification. Engineering departments, for example, have found it necessary to refer to different handbooks in order to determine steel gages available and the decimal sizes of such gages. Ford engineering drawings used to spell out "No. 20 MS gage (0.0359 in.)." Now they say 0.036 in. thick. When considering the magnitude of Ford's operations the mere writing of such information on 25,000 drawings a year is worth something. However, the savings in engineering departments are relatively small, but since they basically decide what manufacturing is to buy, their effective use of such a standard is all important.

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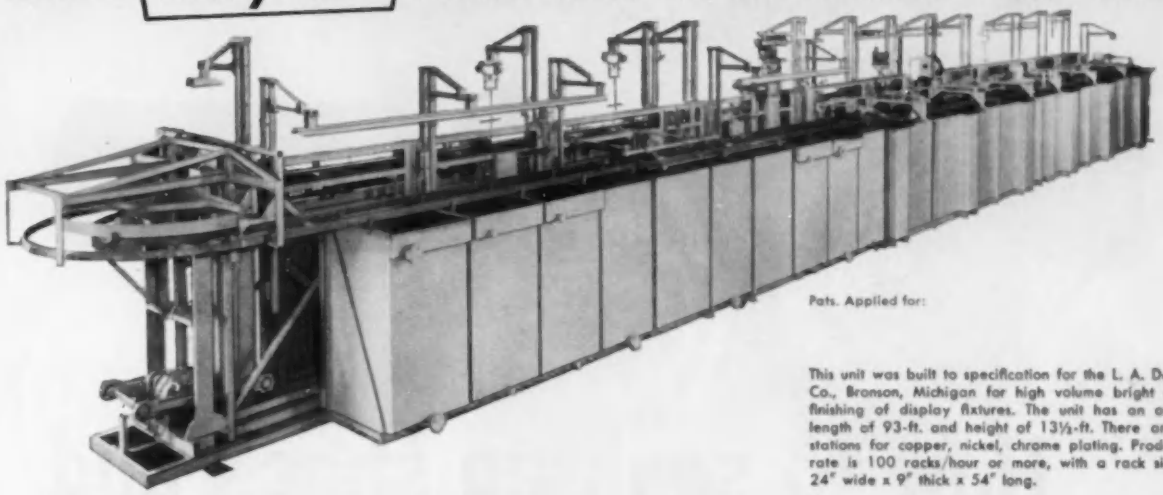
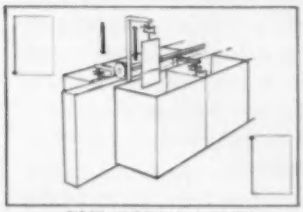


Pats. Applied for:

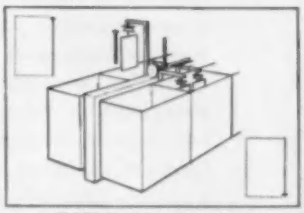
This unit was built to specification for the L. A. Darling Co., Branson, Michigan for high volume bright metal finishing of display fixtures. The unit has an overall length of 93-ft. and height of 13½-ft. There are 27 stations for copper, nickel, chrome plating. Production rate is 100 racks/hour or more, with a rack size of 24" wide x 9" thick x 54" long.

Revolutionary Concept in plating automation...

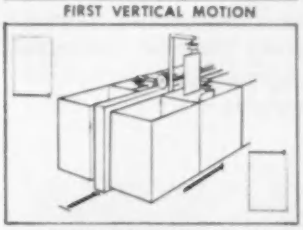
The Wagner Brothers Automatic is a complete and fully automatic mechanism, incorporating a revolutionary vertical transfer and return type work conveying principle which eliminates elevating superstructure, transfer cams, chains and sprockets and hydraulic cylinders above tanks. Many unique design features combine to make this mechanism a smooth operating, perfectly timed unit requiring less than ½ the power of comparably sized units.



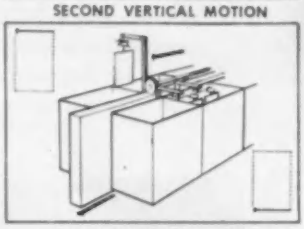
FIRST VERTICAL MOTION



SECOND VERTICAL MOTION



FIRST HORIZONTAL MOTION



SECOND HORIZONTAL MOTION

HOW IT WORKS

All transfer and conveying mechanism is mounted on a reciprocating carriage located between the two rows of tanks. Two basic movements are used to bring parts through the full plating cycle; one forward and reverse straight line horizontal motion and one raising and lowering vertical movement.

Plating racks are attached to work-carriers at the loading station. When the machine is started, lifting arms fixed to the carriage engage the work-carriers being transferred and lift them at all transfer points on one side of the machine, carry them forward to the next station where they are lowered and disengaged from the lifting arm. This sequence is simultaneously produced in reverse on the opposite side so that, when the lifting arms are being lowered on one side, they are raised on the other side.

ADVANTAGES

SMOOTH OPERATION—Operates so smoothly that you can balance a full water glass on the transfer mechanism throughout the entire plating cycle. Obviously such smooth operation will save you time now spent salvaging parts from tanks; dropped there because of the jolting transfer action of ordinary machines. This smooth, positive performance is accomplished because of our hydromotor principle which makes each start and stop gentle as a breeze.

LOW POWER REQUIREMENTS—Powered by one 10 hp motor, this installation uses less than half the power required by comparably-sized units. This is possible because of the almost perfect balance of work load being lifted at one time.

SIMPLE INSTALLATION—Your Wagner Brothers Automatic is delivered to you, either intact or in two or three completely assembled sections, depending upon size. Installation is simply a matter of positioning and leveling.

MINIMUM OF MAINTENANCE—There are few moving parts to wear, no vibrating parts, no backlash in automation, nor little chance of misalignment. Overload protection is given by a by-pass in the hydraulic pump. All working parts can be reached for adjustment without disassembly.

OTHER PLUS FEATURES—Wagner Brothers Automatics require a minimum of space. The model illustrated uses 54-inch racks and operates under a 13½-ft. ceiling. There are no greased parts or hydraulic fittings over tanks where dripping oil could contaminate solutions. Triple contacts on cathode bars afford consistent, uninterrupted current flow. Automatic heat control system gives simple, foolproof regulation of temperature for accurate results. Centralized lubrication can be provided as an optional feature. Drag and dwell times are easily varied with this unit. **Write for free, illustrated folder.**

In addition to high-volume plating, the Wagner Brothers' Automatic is equally well-suited to anodizing (sulphuric and chromic), phosphate coating, etching, electropolishing, oxide coating.

YOUR PRIMARY SOURCE FOR PLATING AND POLISHING EQUIPMENT AND SUPPLIES

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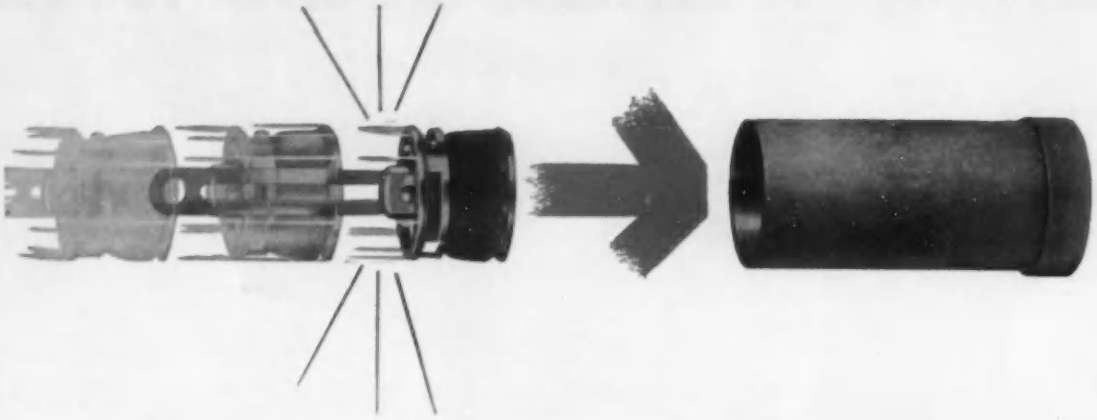
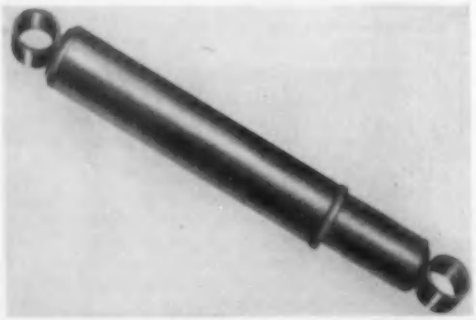


How to soak up shock and

Underwood Corporation did it by using Republic ELECTRUNITE



AUTOMOBILE SHOCK ABSORBER MANUFACTURERS DID IT, TOO, with Republic ELECTRUNITE Carbon Steel Tubing. Extremely close ID and OD tolerances of the cylinder tube enabled manufacturers to use this tubing with a minimum of preliminary finishing. Costs dropped. So did weight. And surplus strength was obtained.

This was the problem: find a material for the cylinder in the carriage shock absorber on an accounting machine. The cylinder must have an accurate bore, little variation in diameter, and negligible eccentricity. It must also have a suitable finish to reduce drag, because the piston which fits inside must be completely retracted in less than a tenth of a second.

Republic metallurgists suggested ELECTRUNITE Stainless Steel Tubing. It was drawn to meet dimensional requirements. The finish was excellent. And Underwood reports good service life because of excellent wearing qualities.

Republic Steel Corporation
3106 East 45th Street
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REPUBLIC STEEL

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- ☐ ELECTRUNITE® Stainless Steel Tubing and Pipe
- ☐ Republic Nuts and Bolts
- ☐ Republic Chateaugay Pig Iron

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Company_____

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BUSINESS MACHINE PARTS COST LESS because they last longer when they're made of Republic Enduro Stainless Steel. On this Addressograph-Multigraph office machine, ink corroded the carbon spring steel from which the ribbon guards and lister spacing bands were made originally. Carbon steel also cracked under the operating strain. Enduro Stainless Steel resists this corrosion, has the necessary springiness and wears well, despite the abrasive action of moving the ribbon.

cut costs!

Stainless Steel Tubing

Underwood now saves 75 cents on material costs for each shock absorber.

This is only one of many customers for whom Republic has saved money. Sometimes we save material costs. Sometimes production costs. Often, both. And since we manufacture both stainless steel and carbon steel tubing in many analyses, we are equipped to help solve all kinds of tubing problems.

Fill out the coupon below for more facts on Republic ELECTRUNITE Mechanical Tubing. Or call your nearest Republic district sales office.

ECONOMICAL MACHINING IS ONLY ONE REASON why a leading maker of heat-resistant glass products uses Republic Chateaugay Pig Iron for glass molds. This premium pig iron, supplied exclusively by Republic, also assures a dense, fine grain structure; longer mold life; fast-flowing and even-cooling characteristics. Hard surfaces resist heat and wear.

CUTTING COSTS ALSO APPLIES TO BUYING FASTENERS for your assembly and maintenance work. One call to your Republic Distributor gets all the fasteners you need. There's no shopping around, no time lost. Paper work is reduced. And, you get exactly what you want because Republic makes and stocks over 20,000 types and sizes of regular fasteners, everything from machine bolts to sheet metal screws. You can depend on Republic Fasteners for quality, uniformity, ease of application, long service life. Quick delivery, too.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

Machine Tool Ball Bearings

(*Continued from page 94*)

housing tolerances must equal those of the bearings. It is also very important that bearing fit, squareness of shoulders and the alignment of the housing bores be extremely accurate. To provide adequate operating life, a lubrication system must be provided such as the air-oil-mist method. The panel members also suggested that the bearings be axially preloaded.

There was a great deal of discussion on the advantages and disadvantages of ball bearings with lighter ring section and a greater number of balls. The advantages pointed out were: large spindle size, smaller and more closely spaced balls, narrower width, and the possible utilization of hollow spindles. On the other side of the ledger it was stated that bearing rings would be hard to produce, would be quite expensive, and would probably have a low capacity and fatigue life. Such bearings would also be more sensitive to spindle and housing irregularities.

The second panel discussion dealt with shaft and housing fits. One of the first questions discussed dealt with utilizing the same mounting fits for housings of different materials. It was suggested that with light loading and smooth housing bores, bearings may sometimes be used directly in soft metal with good results, but tighter than book fits are recommended. Generally, when this is not possible due to temperature range, steel liners are required. One panel member recommended that sleeves should be avoided.

In respect to refining housing bores, it was stated that three processes have been used with considerable success. These are borizing, using a single point carbide tool; bearingizing, which is a peening tool operation; and ballizing, which is a ball broaching operation.

Preloading and its effect on bearing performance was the topic of the third panel session. The advantages of preloaded bearing sets are that radial and axial play can be removed and the spindle can be located more accurately. Also, the preloaded unit will transmit less vibration. On the other hand, there are three disadvantages. A preload set involves a complicated mounting, possible heat generation, and perhaps shorter bearing life. Of course, the latter two conditions prevail primarily if the preload is excessive. In duplex bearings, different contact angles are utilized to obtain maximum operating thrust from the set both axially and radially. It was stated that bearings should be preloaded sufficiently to provide the required radial and axial rigidity. The pros and cons of using preloaded springs versus manual adjustment was discussed at some length. The two basic advantages of manual adjustment are that the preload can be changed with the spindle in place and only a minimum number of parts are necessary. There are four disadvantages of manual preloading. It is difficult to determine zero preload setting; the preloading nut must be positioned accurately; there are too many variables for the determination of the amount of preload by measuring slow turning torque; and a great deal of skill is required by the individual setting the preload. The pros on the spring preloading dealt with accuracy of preload and the wide range of operating speeds and loads possible. Also, with springs, preload

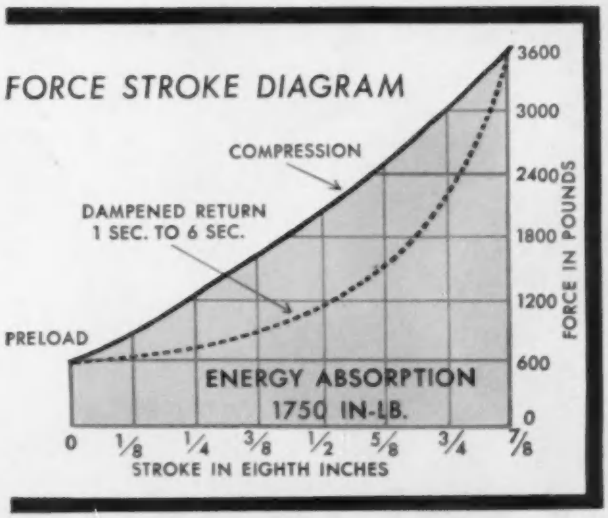
(*Turn to page 144, please*)

WALES *Hydra Spring*®

®TRADE MARK

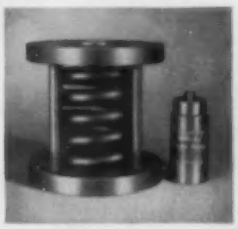
NEW Wales Hydra Spring with built-in valve for dampened return combines spring and shock absorber in one unit. This Wales Hydra Spring was designed, built and used in a high frequency machine.

This small, self-contained, dual action Wales Hydra Spring with *LIQUID COMPRESSIBILITY* is only 4¾" long including 1" stroke by only 2¾" in diameter. The characteristics of compressible liquids, called Wales Comproils, produce the astounding results shown in "Force Stroke Diagram" at left.



Wales Hydra Springs with built-in valve outlast and outperform mechanical springs plus shock absorbers. Also, they are built for any spring force and dampened return combination.

Write for Wales Hydra Spring data TODAY so that you will have all the facts at your finger tips. Better yet, send us an outline of your present spring problem for a "no cost" analysis.



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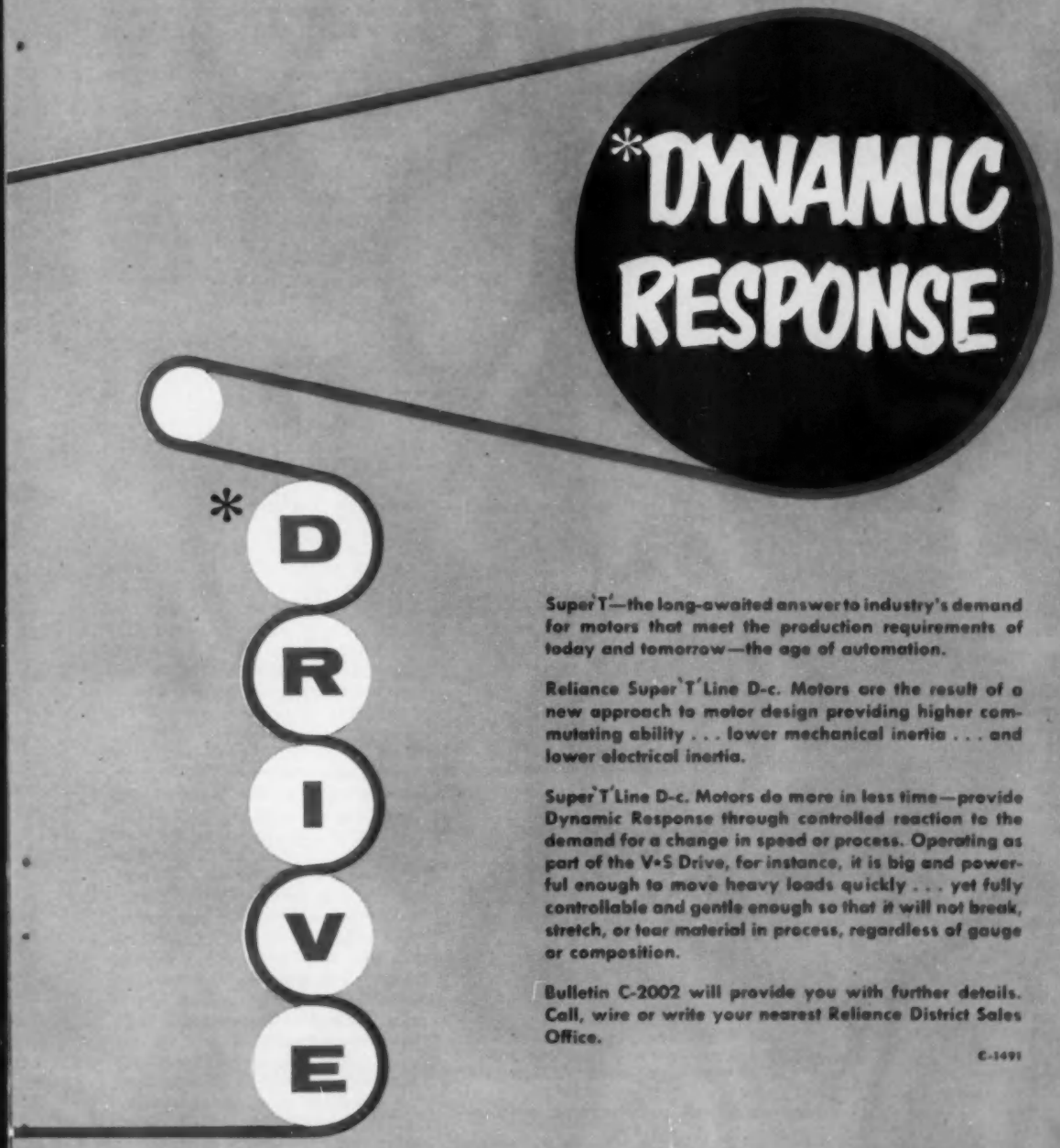
The most revolutionary new motor development in 40 years!



Super 'T'—the long-awaited answer to industry's demand for motors that meet the production requirements of today and tomorrow—the age of automation.

Reliance Super 'T' Line D-c. Motors are the result of a new approach to motor design providing higher commutating ability . . . lower mechanical inertia . . . and lower electrical inertia.

Super 'T' Line D-c. Motors do more in less time—provide Dynamic Response through controlled reaction to the demand for a change in speed or process. Operating as part of the V•S Drive, for instance, it is big and powerful enough to move heavy loads quickly . . . yet fully controllable and gentle enough so that it will not break, stretch, or tear material in process, regardless of gauge or composition.

Bulletin C-2002 will provide you with further details. Call, wire or write your nearest Reliance District Sales Office.

C-1491

Another of the Reliance Tools of Automation

Machine Tool Ball Bearings

(*Continued from page* 140)

can be readily altered by changing the spring specifications and the assembly procedure need not be as exact as with the manual adjustment. Of course, spring preloading is not as positive as manual when reversal of thrust might occur and the design requires a greater number of parts than the manual preload setup.

The fourth panel at the machine tool ball bearing conference had as a subject, "Bearing Lubricants and Their Choice." The first question discussed was the limiting speed of presealed bearings. With this problem, there are two factors which will determine the speed. The first is the limiting speed of the separator and then the limiting speed of the seal. The table gives the limiting speed of grease lubricated ball bearings for three types of separators.

It was stated that the best means to lubricate ball bearings is with an air-oil mist. The major factor is that clean compressed air must be used so that no foreign matter can enter the bearing. At times, these systems have been used under pressures which are extremely high and an oil fog would escape from the machine. These high pressures are not necessary as the generally recommended pressure is from six to 10 psi. Some applications, however, are run as high as 16 psi without fog. One of the advantages of this system is that the mist can be carried some distance without condensing in the lines so that one lubricator can serve a number of positions on one machine. This type of system also cuts down fluid friction, thereby letting the bearings run cooler.

The fifth panel of the two-day meeting concerned itself with the design, limitations and performance of bearing closures. New Departure personnel discussed the new Z-type bearing seal which is composed of a flexible material with metal supporting inserts. The seal can be easily removed and replaced without loss in seal efficiency. The seal will resist axial applied loads of over eight to 10 lb. The seal provides more uniform torque values and higher limiting speeds at lower self-induced operating temperatures. It is currently being made of Buna-N or Hycar depending on temperature requirements. The company is currently working on a seal of this type construction which will withstand temperatures of ap-

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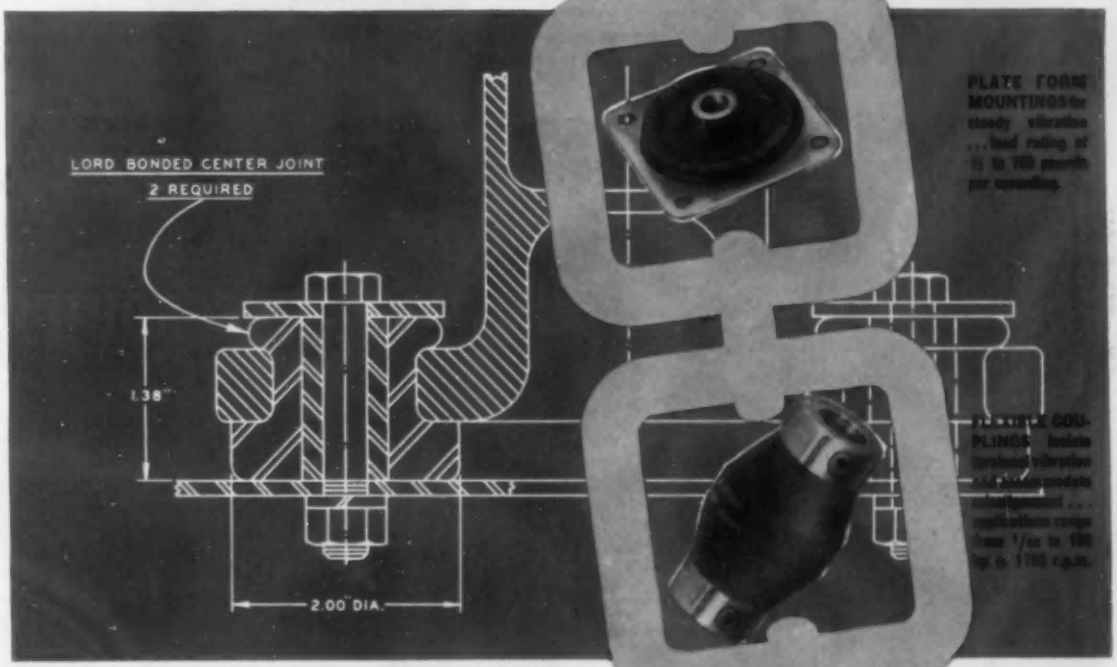

Vibration control is a vital element of improved product performance . . . and the most positive way to control vibration is through LORD Bonded-Rubber Mountings. Here are several outstanding reasons why:

Isolate Vibration — Stop noise transmission or vibration caused by moving mechanical components.

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Reduce Maintenance Expense — the rubber element absorbs flexing action . . . no surfaces to wear or chafe . . . no lubrication is needed.

LORD maintains a staff of vibration engineers to assist manufacturers in isolating destructive vibration. They will gladly assist you by designing and producing the most economical and efficient mounting for your needs. Call or write the LORD Mfg. Co., Erie, Pa.

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proximately 500 F. It is also engaged in research on bearing lubricants prior to obtaining the goal of integral seal bearings, able to operate at 500 F. When such lubricants are available, bearings with the Z-type seal capable of high speed and heavy overload with temperature range of −100 to 500 F will be available.

It was brought out that the sealing efficiency and operating temperatures of shaft rubbing seals are almost in direct proportion to the condition of the shaft surface contacting the sealing member. A finish of five micro in. for high speeds and never greater than 20 micro in. at lower speeds is recommended. A hardness of 30 to 40 Rc is desirable. A soft shaft having tool marks must never be used.

In connection with the sixth and final panel, which dealt with spindle bearing life, the conference's attention was called to the research program being carried out by New Departure to develop smaller gas turbine bearings capable of being grease lubricated and running at speeds of 100,000 rpm or higher. In order to reach this goal, greases will have to be developed to withstand the temperature range of operation. When and if this project is brought to a successful end, it will be possible to have increased use of grease lubrication in high speed spindles.

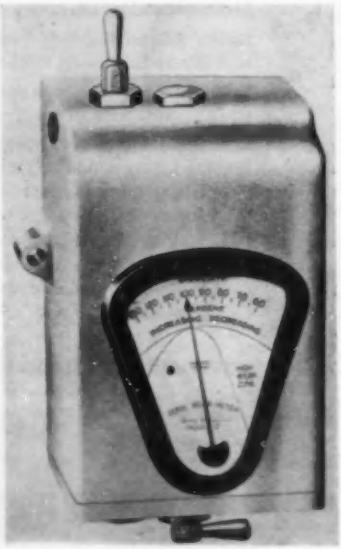
Answering the question of noise reduction and vibration at high speeds on ball bearings, it was stated that appreciable reductions have been obtained by utilizing balls made to closer tolerances and providing improved race finishes.

NEW ACCESSORIES

Wear Meter

An engine wear meter has been announced by *The Gerin Corp., Avon, N. J.* It is permanently attached to any engine and claims to warn the operator when there is fuel dilution, water or antifreeze leakage, running on dead filters, wrong grade make-up oil and the like. The meter responds to any increase or decrease in viscosity. Viscosity is said to be the best and most sensitive indicator for changes in the crankcase oil which

(*Turn to page* 148, *please*)



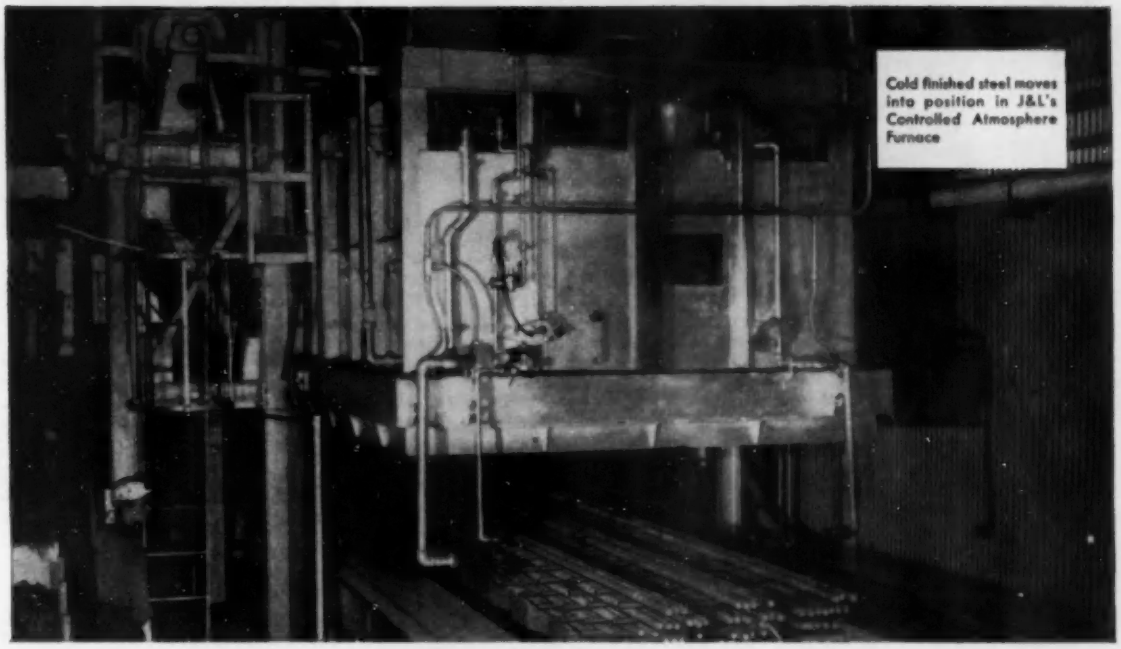
Cut Your Production Costs

whatever treatment you need:

- bright annealing
- case carburizing
- normalizing
- stress relieving
- carbon restoration

thermal treatment in prepared atmosphere furnace

saves you time
lowers over-all costs



Cold finished steel moves into position in J&L's Controlled Atmosphere Furnace

Why incur the trouble and costs of thermal treatments when J&L can do the job for you . . . quickly and economically? J&L's Controlled Atmosphere Furnace can be employed to improve the machinability or to meet the mechanical properties you need in your bar stock.

Order J&L Cold Finished Bars—thermally treated to the needs of your production line.

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Without obligation please send me your booklet "Extra Services to Users of Cold Finished Steel."

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Company _____

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City _____ Zone ____ State _____

New Accessories

(*Continued from page* 146)

the operator must guard against to avoid rapid wear. The maker says this meter does not respond to the normal thickening or thinning of the oil incidental to varying operating temperatures. Hot or cold, the indicating hand points only to true and permanent changes. Accuracy within one per cent is claimed.

Air Signal

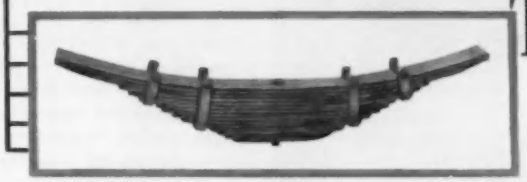
Conforming to I.C.C. Regulation 193.51, this signal warns a truck operator when the air pressure in the brake lines begins to drop. When brake air pressure begins to fall, a

red Lucite rod starts to appear, increasing to its full length, at which time a minimum of 50 lb of pressure remains. This warns the operator before the pressure reaches the danger point. The signal is actuated by the air pressure itself. *Robinson Products, Inc., 16550 Wyoming Ave., Detroit 21, Mich.*

Lighter Tarp

A light-weight, long-lived tarpaulin material constructed by a patented process involving nylon and neoprene synthetic rubber is now being introduced by the *Du Pont Co.'s Fabrics Div.* Medium weight Fairprene tarpaulin has a proved life expectancy twice that of No. 8 treated duck in common use and is expected to go higher than three times, based on the condition of the tarps in current field tests. The medium grade, moreover, is only one-half as heavy as duck. Tear resistance rates more than four to six times greater. It reportedly will not shrink, nor take on added weight through water absorption in wet weather.

dependability is important to *Lufkin*



That's why *Lufkin* depends on BURTON

TRAILERS produced by Lufkin are among the heaviest in the industry . . . designed to carry tremendous loads which impose heavy responsibilities on every structural part of body, frame and chassis . . . and especially on the springs.

Here is where Burton dependability is indispensable . . . for the performance of the springs profoundly influences the performance of the entire vehicle.

We invite you to follow the example of America's foremost trailer and truck manufacturers by bringing your spring problems to the attention of Burton's engineering staff, as early as possible in your planning stages.

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. . . Vital Support for the Automotive Industry . . .

WESTERN AVENUE AT FORTY-EIGHTH STREET • CHICAGO 32, ILLINOIS

American Methods Fitted to German Conditions

(*Continued from page 57*)

trough. There they are picked up by an elevator conveyor and dropped into the ram head of a shaper-type broach which machines two flats on one end. Workpieces then fall through the floor to the shop below where mushroom heads are cold formed.

The bulk of all machine tools at VW are German, although the 150 American machines in use are the next largest group. The component machining section has 120 four- and six-spindle automatics and 150 single-spindles.

There are two closed-circuit engine assembly lines. The larger has 24 stations on the outside, staggered with 24 on the inside, to form two complete lines. Engines are clamped in rotary turnover fixtures. Conveyor speed is 3 fpm, and output is 53 engines per hr. The smaller circular line, on the same pattern but with fewer stations and slower travel, has an hourly output of 44 engines.

Transfer presses, all of German make, are widely used. One seven-station Schuler machine forms crankcase drain plugs ready for threading at the rate of 1200 per hr. Coiled stock of 0.07 in. is straightened, blanked, and the scrap automatically cropped to short lengths. Welding nuts of several sizes for body assembly are drawn on seven-station Hiltmann & Lorenz "HiLo" presses, again with continuous feed.

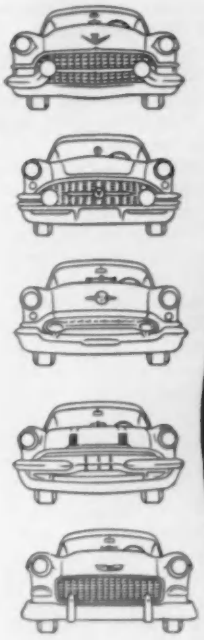
Another machine by the same maker forms hub caps in eight stages. Round blanks are manually loaded to the first gripping jaws of the reciprocating rails. Operations include drawing; trimming, with scrap segmentation and disposal; flange forming; embossing the VW emblem; inward flange turning; and flange rolling. Cycle time, which is infinitely variable by pushbutton control, is normally set at 10 pieces a minute to produce 4000 hub caps in one shift. Latest transfer press is an eight-station Weingarten machine for making the ball joint covers for attaching the articulated half-axles to the differential housing.

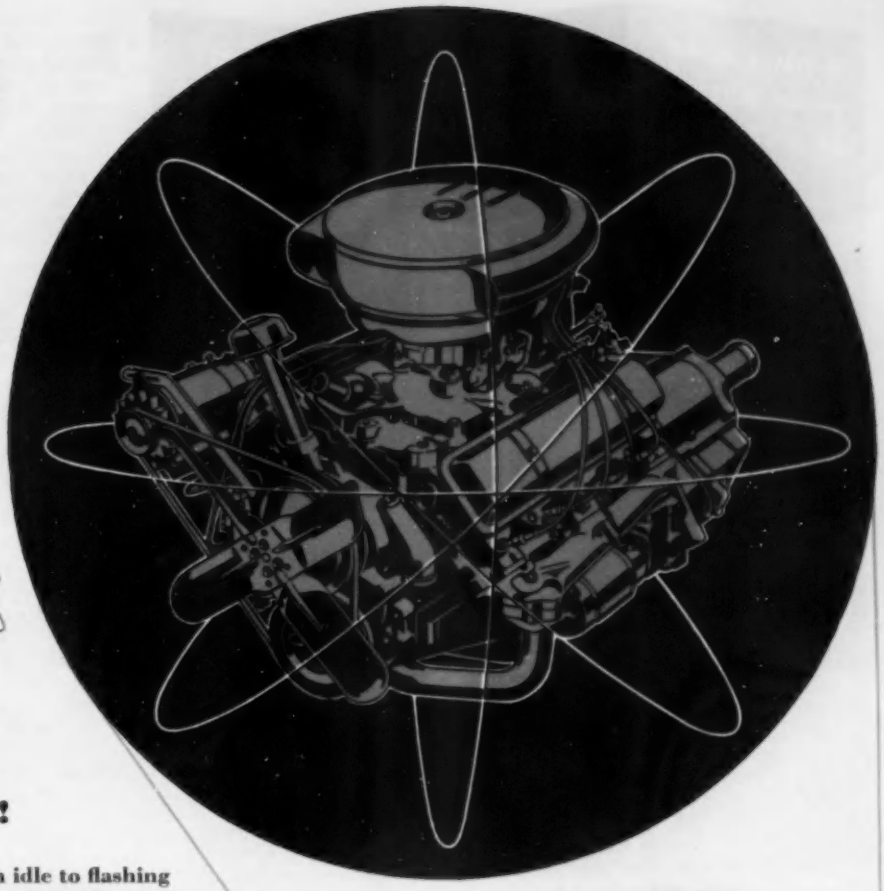
Automation between heavy presses for fenders has been anticipated in the layout of four new 500-ton Weingarten machines which have just been installed. These double-sided units are located in line with two existing presses to facilitate eventual straight-through transfer of work.

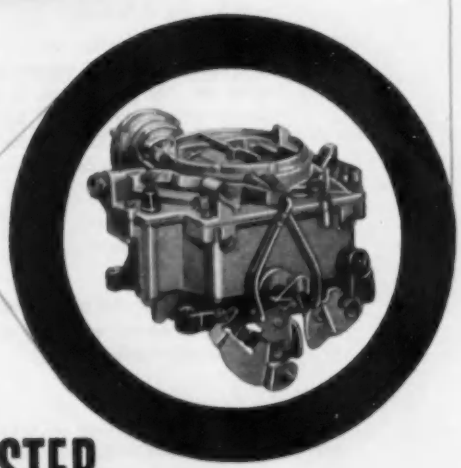
Meanwhile, they have been linked up with twin-cradle carrier-dollies transported by drag chain conveyor between and around the presses. Cradles, padded with foam rubber and leather covering, are designed to receive left- and right-hand fenders (delivered by Sahlin Iron Hands), and index automatically for correct and easy loading for the subsequent pressing.

Further expansion in the press section is planned with nine new Clearing machines for the car roof panels. Excavation on the plant floor was in progress at the time of the visit.

Body pressings are assembled and spot welded on a massive fixture formed by seven in. diam vertical steel columns braced between a cast iron bedplate and the steel ceiling beams. Locating plates and hinged







An engine never had it so good!

From a slow, smooth idle to flashing full throttle—you can depend on your Rochester Carburetor for *top performance, top efficiency!* For every Rochester Carburetor is a perfect mixer—specially engineered to blend the *right* amount of fuel with the *right* amount of air in today's high-powered, high-performance engines. And Rochester Carburetors are rugged and versatile—outstanding performers in hot or cold weather, in tight traffic or on the wide open road. That's why Cadillac, Buick, Oldsmobile, Pontiac and Chevrolet . . . *all choose Rochester!*

CARBURETORS BY ROCHESTER PRODUCTS

ROCHESTER
PRODUCTS
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ROCHESTER N.Y.

door frames are cast iron, and panels are secured by toggle clamps. It is claimed that accurate alignment and avoidance of all metal stresses are consistently obtained. Four men weld a complete body in four min, and six of these rigs are used.

Another effective welding setup is for seaming the two pressings of the gas tank. Round electrodes pinch the flanges of the square tank, the latter being pneumatically clamped on a hinged fixture. The tank is free to rotate, and a follower plate ensures its correct positioning relative to the driving electrodes. Floor-to-floor time is one min 20 sec, and 330 tanks are welded per shift on each of two machines.

Hub cap pressings are ground before plating on large double-ended machines, each grinding wheel being paired with an independent wheel axially displaced from the main spindle. Caps are placed on a circular plate which spins them while oscillating across the faces of the two wheels in a true arc corresponding to their curvature.

After washing, hub caps are copper plated on a fully automatic machine built by Dienert, of Stuttgart, in which the work carriers are passed through the successive solutions by reciprocating transfer bars and an elevating superstructure. They are then buffed, and finally nickel and chrome plated on similar transfer equipment. Smaller parts are copper, nickel and chrome plated in a continuous sequence in a new machine which has recently been installed.

Six body paint lines are now in use. The newest consists of an enclosed tunnel in two parallel lines with a total length of about 1200 ft, along which bodies are conveyed at five fpm. Output of this line is 300 finished units per two-shift day.

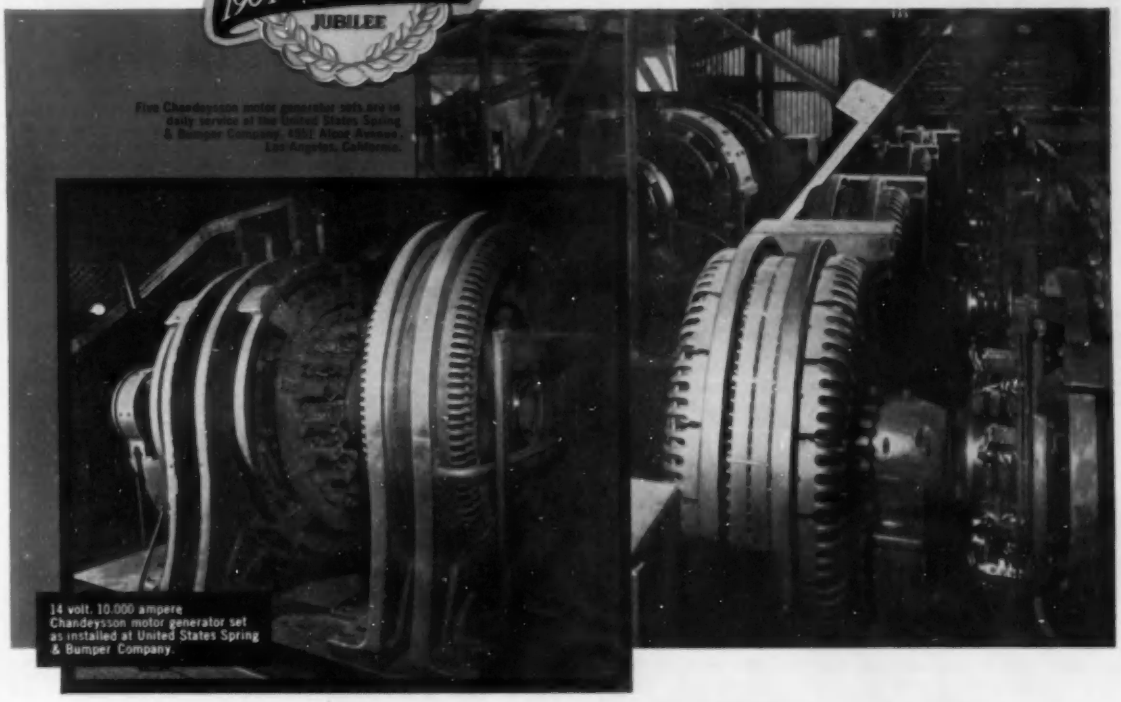
At the start, raw bodies with fenders loosely attached are dropped onto a floor conveyor. At three minute intervals the entrance and intercompartment doors open and the body first passes into a hot degreasing spray booth. This is followed by water rinse, chemical rinse, bonderizing, rinse, and neutralizing bath. After passing along a 65-ft gas-fired drying oven, the body is manually hooked onto an overhead chain conveyor which drops it into a primer dip and then along a draining trough. From there it is carried through an infra-red drying zone heated to 280 deg C, a hand touch-up booth, and a final drying oven.

Each body emerging from the first

(*Turn to page* 156, *please*)

Chandeysson CUTS COSTS OF POWER CONVERSION

GOLDEN JUBILEE 1904 Chandeysson 1954



Five Chandeysson motor generator sets are in daily service at the United States Spring & Bumper Company, 4001 Alcot Avenue, Los Angeles, California.

14 volt, 10,000 ampere Chandeysson motor generator set as installed at United States Spring & Bumper Company.

IN 23 YEARS "WE HAVE SPENT PRACTICALLY NOTHING FOR MAINTENANCE AND REPAIRS" Says

UNITED STATES SPRING & BUMPER CO., Los Angeles, California

"And," continues Mr. John B. Rauen, President of United States Spring and Bumper Company, "we are still using the first Chandeysson generator we ever bought . . . even though we have given it pretty rough treatment at times. We have 5 Chandeysson generators now, all giving dependable service although we overload them quite heavily at times."

So says another long-satisfied Chandeysson owner . . . proof once again that any way you look at it, any way you figure it, "Chandeysson cuts costs of power conversion." You can expect similar performance from a Chandeysson installation in your plant.

Write, or mail coupon, for full information.

CONVERT WITH Chandeysson AND SAVE 4 WAYS

- Use less power
- Get more out of the power you pay for
- Be sure of power when you need it most
- Enjoy lifetime power dividends

Bulletin D-102 contains data and specifications on Chandeysson machines. Your copy sent promptly, and without obligation.

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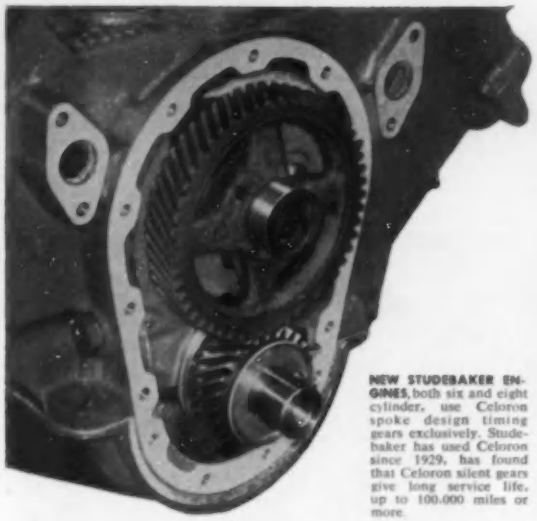


NEW STUDEBAKER ENGINES, both six and eight cylinder, use Celoron spoke design timing gears exclusively. Studebaker has used Celoron since 1929, has found that Celoron silent gears give long service life, up to 100,000 miles or more.

by John A. Petho, Development Engineer
Celoron Division, Continental-Diamond Fibre Company, Bridgeport, Pa.

The basic requirements for automotive timing gears are smooth transmission of power, quietness and reasonable service life. Depending on the installation these requirements will have varying degrees of importance which can be controlled to a large extent by the selection of the material, design, and quality of workmanship.

Material and design are closely related, but only too frequently changes in the powerplant have been made without corresponding changes in design and material. For this reason, a brief review is given of the design advantages of Celoron, a cotton fabric-based gear material, and of Celoron laminated rim timing gears.

WHAT IS CELORON?

It is the trademarked name of over 30 years standing for a laminated or macerated molded industrial plastic made only by C-D-F for a wide range of gear and mechanical and electrical insulation needs. It designates one of the best, if not the best, high impact molded fabric phenolics for mechanical applications. For timing gears, a phenolic type resin bonds the laminated and macerated cotton fabric into a blank that has the required mechanical strengths. Over the years, we have learned the importance of selecting cotton fabric with the proper weave and weight. Consequently, the design engineer has been given a gear with greater strength, less and more uniform tooth wear, quieter operation.

TYPES OF GEARS MADE FROM CELORON

For original equipment, the laminated rim construction has become standard with two types of construction between the rim and the hub. The gears can be light, medium or heavy duty types. The weight of the fabric used for the gear rim is controlled by the DP of the gear. The WEB gear offers a quality gear with the least possible finishing. The SPOKE gear incorporates many fundamental principles of design long used for quieter operation and longer life. The spokes absorb most of the critical vibrations, have greater resilience and flexibility. However costs are slightly higher.

COMPARATIVE AVERAGE PROPERTIES

	Laminated (rim)	Macerated (web or spoke)
Tensile Strength, psi	10,000	6,500
Flexural Strength, psi	20,000	10,000
Compressive Strength, psi	38,000	25,000
Shearing Strength, psi	12,000	8,500
Izod Impact Strength, flatwise (Notched in ft. lbs. per 1" of notch)	4.0	2.3

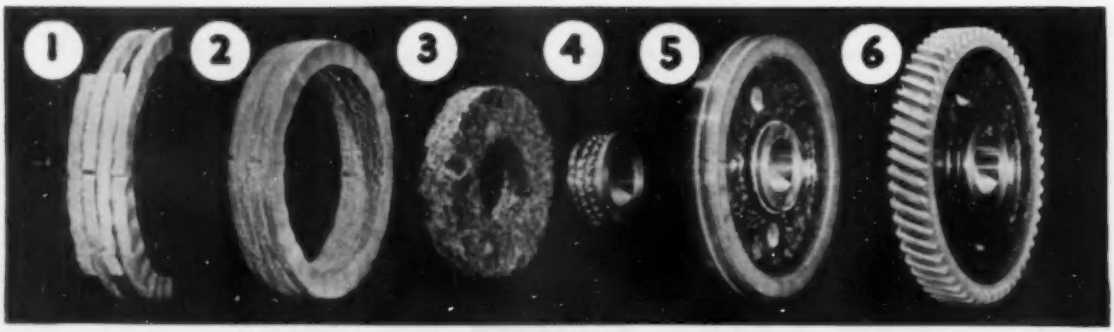
UNIFORM TOOTH STRENGTH

The segments forming the gear rim are punched in such a way that the stronger direction of the fabric is used to form the flank of the gear tooth. This results in a stronger, uniform gear.

WEB FLEXIBILITY

To mold a non-uniform cross section web, laminated construction cannot be used. The treated canvas is macerated to permit shape molding. An important factor of web strength is the size of the particles used. Too large or too small particles will reduce the strength and influence the moldability of the gear. It is necessary to control the weight of each cake of macerated material, assuring a better quality gear.

The molding of the gear web permits the designer to introduce various degrees of flexibility to the gear. In some helical gear installations the service life of the gear can be directly related to flexibility. This is a problem which can be best solved by experience, knowledge of the material and complete knowledge of requirements of the installation. Unfortunately, all these factors are very seldom at the command of the gear designer.



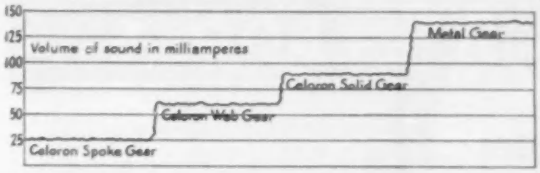
HERE IS HOW a Celoron gear gets its higher tooth strength, more flexibility, greater impact resistance: 1. A special grade of tough cotton is coated with phenolic varnish, then cut into strips and punched into segments. 2. These segments are staggered and piled up into the outer rim which will become the gear teeth. 3. The web or inner ring is made of macerated cloth —gives the gear its side flexibility. 4. The metal bushing is inserted and the make-up is put in to the mold. 5. The resin softens, the coated fabric flows and fills the mold. On hardening, a strong Celoron gear blank is produced. 6. Teeth are then cut in the laminated rim. Tests show they have higher impact strength and more resistance to wear!

advantages of C-D-F LAMINATED RIM

TIMING GEARS

SOUND HARMONICS OF CELORON

There is no mechanical motion without friction. Friction develops vibrations which are in turn transmitted to the air, thereby producing noise. As all sound is characterized by waves of definite frequency and amplitude, these characteristics of frequency and amplitude enter into a consideration of gear noise. Frequency of a gear noise is determined by the number of tooth contacts per second.



Amplitude of a gear noise is the result of a number of factors, such as the material and shape of the gear and gear housing.

Celoron has a natural low tone frequency and design changes in the structure of the web further reduces the tendency of noise pickup. With a spoke design, it is possible to break up the continuous line of sound between the hub and rim, practically eliminating the pickup and amplification of sound.

HORSEPOWER RATING OF CELORON

Because Celoron is a non-metallic material, when calculating the horsepower rating of Celoron timing gears, use this modification in the velocity factor of the Lewis Formula.

$$\text{Velocity factor} = \frac{150}{200+v} + .25$$

$$\text{SWS} = 6000 \times \frac{150}{200+v} + .25$$

$$\text{HP} = \frac{0.000095 \times \text{SWS} \times \text{FW} \times \text{Y} \times \text{PLV}}{\text{DP}}$$

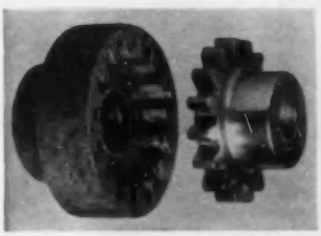
This formula, adopted by the American Gear Manufacturers Association, takes into consideration the characteristics of Celoron. Results obtained in service have supported its use.

POSITIVE KEYING

Celoron which basically belongs to the plastic family has one of the disadvantages of plastics which is a limited amount of compressibility or plastic flow when subjected to a continuous load such as exists at the keyways. To overcome this characteristic and to distribute the loads at the keyway, a steel bushing is molded in the Celoron gears for the bore and the keyway. The steel bushing is anchored to the Celoron, in the molding operation, with staggered interrupted splines instead of the customary diamond knurls. This method is a C-D-F development.

GEARS VERSUS CHAINS

It would be presumptuous of me to set down all the pros and cons of this engineering tug-of war. C-D-F naturally believes in gear timing and has worked to apply Celoron to its fullest use.



CELORON FLEXIBLE COUPLINGS are designed for horizontal as well as vertical drives. The female end of the sprocket type coupling is molded of macerated Celoron which transmits power smoothly and quietly. Write for folder CS-53 with design-ordering information.

Here are a few random quotes, not from plastics engineers, but from automotive design engineers:

"Our experience indicates that timing gears are extremely satisfactory. Probably one of the problems in satisfactory timing gear life is associated with crankshaft stiffness and the fact that the V-8 engine has a relatively short rigid shaft makes a timing gear ideal for this type of engine."

ANOTHER INTERESTING ONE: "From a cost standpoint the gear drive is less expensive than the timing chain drive."

AND ANOTHER: "Even the shortest camshaft drive chains consist of approximately 450 parts. Each of these parts is subject to wear. It is evident that even the slightest trace of wear on each individual part will add up to quite an imposing total for the entire chain. A gear drive for a camshaft has only two parts to wear. Even then the wear is distributed over the entire tooth width instead of being localized."

C-D-F laminated rim Celoron web gears with metal gear.

SUMMARY ON CELORON

The foregoing are a few of the points which make Celoron a desirable material for automotive timing gear applications. There are many more from a cost and customer service standpoint. The material is being continually improved and in its 30 years of existence the only thing remaining of the original material is the name of Celoron. New resins, new fabrics, new methods of molding have made Celoron stronger and lower priced. Semi-automatic molding operations provide open capacity for supplying Celoron. Plant capacity has been steadily increased each year since 1946.

However, all the good inherent properties of Celoron can be destroyed by faulty design. It is always a good policy to discuss the design problems with the manufacturer of the material. Write for test data and samples. C-D-F wants to help you, is a big reliable source of supply!

CDF *Continental-Diamond Fibre*

CONTINENTAL-DIAMOND FIBRE COMPANY
NEWARK 2, DELAWARE

Volkswagenwerk

(*Continued from page* 152)

leg of the tunnel is mounted on a dolly for wet sanding. It is then attached broadside to the overhead conveyor where it starts to double back on the return circuit. After hot drying and compressed air cleaning by hand, the body is lowered into the first water-wash spray booth. Here one handspray man puts the first coat on the right side only, and the body is raised and dropped into the next booth where the left side is sprayed. The sequence for the second coat is drying, air cleaning, dry sanding, and right- and left-side spraying with two men in each booth. Finish drying is at 130 deg C for 45 min.

According to Volkswagen's plans, the entire paint section, together with the three final assembly lines, is soon to be moved to a new building of nearly one million sq ft which has just been completed. Meanwhile, construction of a new body and assembly plant for the Microbus has started in a suburb of Hannover, where there is no shortage of labor. Space thus cleared at the main Wolfsburg factory will be devoted to further rationalizing and increasing production of the car. Output is scheduled to exceed 300,000 units this year, and the export drive will be correspondingly stepped up. The American market is one of the principal targets, and sales there in 1955 are expected to top 20,000—more than twice those of last year. The dollars earned will, it is hoped, make it possible for VW to buy more American machinery.

A second article will describe the production of round and laminated torsion bars by Volkswagen.

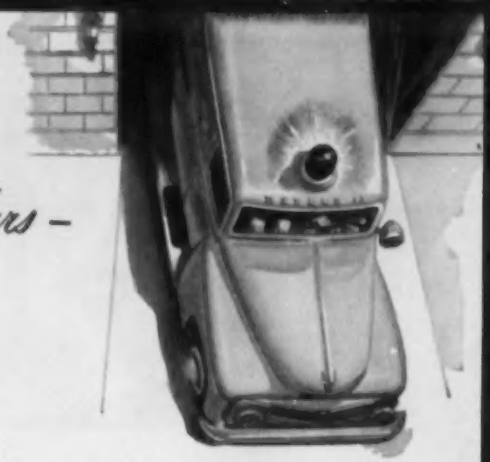
BOOKS . . .

THE 20TH CENTURY CAPITALIST REVOLUTION, *by Adolf A. Berle, Jr., published by Harcourt, Brace & Co., 383 Madison Ave., New York 17, N. Y. Price, $3.00.* In this analysis of capitalism in the present day, the author focuses attention on the corporation. Treating it primarily not as a business device, but as a social and political institution, he shows that it is capable of becoming one of the master tools of society or, mishandled, of becoming a destructive monster. Today it—and we—are at a crossroad of history. Out of this study of the corporation in principle and in operation emerges a bold, new working hypothesis in political theory. This book, it may be argued, represents the first complete overhauling of our concepts of capitalism since the pioneer work of Adam Smith and David Ricardo. In it lies a clear and conclusive refutation of Marxist philosophy.

HEAT TREATMENT OF GRAY IRON, *by C. O. Burgess, published by Gray Iron Founders' Society, Inc., 930 National City, East Sixth Bldg., Cleveland 14, O. Price, $5.00.* This new 123-page manual is an authoritative discussion on the heat treatment of gray iron. Written in non-technical language, it includes sections on stress relieving, annealing, induction hardening, flame hardening, full hardening, tempering, and other heat-treating procedures. It contains a full description of all known heat-treating procedures for the engineer and the practical operator. Effectively illustrated and including numerous commercial and practical examples, it should be most valuable in suggesting improvements in production, quality and economy.

NICKEL IN IRON AND STEEL, *by A. M. Hall, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, $10.00.* This book reviews and correlates all of the important published data on nickel as an alloying element in steel and cast iron; nearly 800 papers were reviewed for this manuscript. The introduction is concerned with the occurrence and refining of nickel ores. The rest of the book contains material on such important topics as: the physical properties of steels containing nickel; the structure and heat treatment of wrought and cast nickel steels; and the effect of nickel on various engineering properties. Corrosion and the welding of nickel steels are discussed in detail. The effect of nickel on the constitution of cast iron, its tensile strength, and its hardness are a few of the other important subjects treated in the volume.

When fast starts mean lives or dollars –



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CALENDAR

OF COMING SHOWS AND MEETINGS

AMA National Packaging Exposition, International Amphitheater, Chicago, Ill. .....April 18-21
SAE Golden Anniversary Aeronautic Meeting, Production Forum, and Aircraft Engineering Display, Hotels Statler and McAlpin, New York, N. Y. .....April 18-21
Fibre Box Association, spring meeting, Edgewater Beach Hotel, Chicago, Ill. .....April 19-20
International Motor Show, Turin, Italy .....April 20-May 1
Society for Experimental Stress Analysis, spring meeting, Hotel Statler, Los Angeles, Calif. April 27-29
American Zinc Institute, annual meeting, Drake Hotel, Chicago, Ill. .....April 28-29
German Industries Fair, Hanover, West Germany .....April 24-May 3
Society of Aeronautical Weight Engineers, annual conference, Hilton Hotel, Ft. Worth, Tex...May 2-5
British Industries Fair, London and Birmingham, England .....May 2-13
First International Aircraft Mart Exposition, Will Rogers Memorial Coliseum, Ft. Worth, Tex., May 3-5
Fourth International Aviation Trade Show, 69th Regiment Armory, New York, N. Y. .....May 4-6
Society of the Plastics Industry, annual meeting and conference, cruise on "Queen of Bermuda," May 7-15
Industrial Waste Conference, Purdue Univ., Lafayette, Ind. ..May 9-11
Metal Powder Association, annual meeting and show, Philadelphia, Pa. .....May 10-12
Sixth National Materials Handling Exposition, International Amphitheater, Chicago, Ill.....May 16-20
Fabricating Machinery Hydraulic Conference, Hotel Statler, Detroit, Mich. .....May 17-18
National Telemetering Conference, Hotel Morrison, Chicago, Ill. May 18-20
American Society for Quality Control, ninth annual convention, Hotels Statler and New Yorker, New York, N. Y.....May 23-25
International Internal Combustion Engine Congress, The Hague, Netherlands .....May 23-28
Indianapolis Race, Indianapolis, Ind. May 30
Canadian International Trade Fair Toronto, Ont. .....May 30-June 10
American Welding Society, spring meeting, Hotel Muehlebach, Kansas City, Mo. .....June 7-10
Paris Aeronautical Show, France June 10-19
Le Mans 24-Hr Race, France..June 11-12
SAE Golden Anniversary Summer Meeting, Chalfonte - Haddon Hall, Atlantic City, N. J...June 12-17
ASME Semi-Annual Meeting, Hotel Statler, Boston, Mass. ....June 20-22
ASTM Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. .....June 26-July 1
SAE Golden Anniversary West Coast Meeting, Hotel Multnomah, Portland, Ore. .....Aug. 15-17
NMTBA Machine Tool Show, International Amphitheater, Chicago, Ill. .....Sept. 6-17
Production Engineering Show, Navy Pier, Chicago, Ill. .....Sept. 6-17

New B&D 5" and 6" Portable Grinders —more powerful, lighter in weight. For grinding welds and general shop use . . . from **$88.00**

Keep tools sharp. Spot B&D Bench Grinders around your shop. Four models . . . from **$49.50**

New B&D 7" Standard Sander does all kinds of surfacing jobs . . . with abrasive discs, grinding wheels, wire cup brushes and planer heads . . . **$70.00**

New 7" Heavy-Duty Sander-Grinder with 90% more power. And, a powerful new 9" Sander-Grinder (not shown) for heavy-duty production jobs . . . from **$79.50**

20% more power, 20% less weight— NEW Black & Decker 7-inch Standard Sander does your tough jobs easier, faster

This new B&D 7-inch Standard Sander has been redesigned to give you everything you want. *More power*—20% more to handle your toughest jobs. *Less weight*—by one-fifth—and better shaped handle to help reduce operator fatigue. *Spiral bevel gears* that provide an even flow of power. *New type centrifugal fan* that keeps commutator cool, motor free of abrasive dust. Exhaust air is directed away from operator. The specially-designed Black & Decker-built motor is tailored to meet the heavier needs of this model. Use it with accessories to sand, grind, wire brush—quickly and easily. You'll find the new 7-inch Sander is indispensable. See your B&D distributor for demonstration. Or write: The Black & Decker Mfg. Co., Dept. 1604, Towson 4, Maryland.

For nearest distributor, see "Tools-Electric"

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker®

PORTABLE ELECTRIC TOOLS

AI TABLOID

(*Continued from page 37*)

North American Aviation, Inc., is developing the SM-64 surface-to-surface guided missile. The company is also constructing a new $1.5 million calibration and test building.

* * *

Sterling Precision Instrument is said to be planning to acquire control of American-La France Foamite Corp. . . . Thew Shovel Co. is reportedly seeking to buy the inventory and plant of Byers Machine Co.

* * *

Curtiss-Wright Corp. was recently disclosed to be the holder of an Air Force contract for design studies pertaining to the application of atomic power to aircraft propulsion.

* * *

Dreis & Krump Mfg. Co. has completed a new 40,000 sq ft building for assembly of smaller models of press brakes and presses of 11 to 150-ton capacities.

* * *

F. J. Stokes Machine Co. has opened a new district sales office at 25 East 1st St., Mount Vernon, N. Y. . . . Wall Colmonoy Corp. has opened a new branch plant for its Stainless Processing Div. at Montebello, Calif.

* * *

Clearing Machine Corp. has created a department for research into new techniques of pressworking metals. It will also develop equipment for improved metalforming efficiency.

* * *

Fruehauf Trailer Co. has bought a 5½-acre tract near Portland, Ore., for a new service plant . . .

* * *

Aerfer Co. of Italy has put the finishing touches on the Sagittario light fighter with a Derwent jet engine supplied by Rolls-Royce.

* * *

Automotive Spring Corp. is increasing its production capacity 50 per cent . . . Aluminum Co. of America is undertaking a $5 million expansion of aluminum rolling mill equipment at its Davenport, Ia., works.

Globe Industries, Inc., has established a new Commercial Aircraft Products Dept.

* * *

Acar Broach Co. has opened a new plant in Roseville, Mich., to fabricate metal dies and molds for shaping plastic parts. . . . Bristol Aeroplane Co. .s producing a new type of plastic drop-tank for aircraft.

* * *

Radioactive-tracer techniques are being used at the dynamometer laboratory of the Univ. of Mich. They are employed to study heavy-duty final drive gear failures.

* * *

Strick Co. has a royalty agreement with a new truck-trailer factory operating in Mexico City.

* * *

Goodrich-Gulf Chemicals, Inc., has reported the successful reproduction of crude rubber synthetically.

* * *

Plans are under way for a proposed merger of Remington Rand, Inc., and Sperry Corp.

* * *

Glidden Co. has purchased the assets of Zapon Industrial Finishes Div. of Atlas Powder Co.

Classified Advertisements

Service facilities available for manufacturer of equipment who can extend desirable service franchise for Wisconsin, surrounding area. Very dependable mechanics and shop presently servicing automotive-industrial equipment. Box 90, Automotive Industries, 5601 Chestnut Street, Philadelphia 39, Pa.

PATENT NUMBER 2,703,147. Helicopter, actuation-control, durable performance, sale or license. Box 91, Automotive Industries, 5601 Chestnut Street, Philadelphia 39, Pa.

For Sale, Auto Parts Manufacturing sold to jobbers 55 dies, machines optional. Milescraft, Meech Ave., Cleveland 5, Ohio.

POWERFUL Homelite Model 17 Chain saw being assembled in Homelite factory at Port Chester, N.Y.

ONLY 22 LBS., Model 17 Homelite Chain saw delivers 3.5 hp — power to spare for felling trees 4 feet in diameter. Cuts up, down, left or right; is easily carried up trees.

Girl assembles chain saw 30% faster with RB&W SPIN-LOCK screws

SPIN-LOCKS hold tight where previous fasteners let go

Usually production men turn to RB&W SPIN-LOCK screws because they need a fastener that won't lose its grip.

But Homelite Corporation of Port Chester, N.Y. got a lot more value than they expected when they tried SPIN-LOCKS on their famous chain saws. Regular screws plus washers had loosened rapidly under vibration when the saws went to work.

SPIN-LOCK cured this problem, of course. Homelite reports: *"We've had no loosening of screws when the saws get out in the woods."* And, Homelite goes on, *"We also found through time studies that we saved an average of 30% in time required to insert and drive the screws — giving us lower labor cost and faster assembly time."* What's more, *"The average cost of* SPIN-LOCKS *and regular screws plus washers is just about the same."* Measure of Homelite's satisfaction: the new Model 17 saw uses *79* SPIN-LOCKS in *16* types and sizes.

Whether you want a fastening device with a bull-dog grip or a way to lower assembly time and costs, an RB&W SPIN-LOCK screw could be the answer. It's easy to find out — just write the nearest RB&W office. RUSSELL, BURDSALL & WARD Bolt and Nut Co., Port Chester, N.Y. 4.11

Check Sweet's Design File for RB&W SPIN-LOCK Catalog

RB&W Spin-lock

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The Tighter, Stronger, Surer Fastener!

110 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

ON OUR WASHINGTON WIRE

Larger orders for machine tools, a longer work-week in manufacturing industries, and indications of heavier plant investment this spring are contributing to a well-defined business upswing. Demand for machinery in general, and for metal-cutting machine tools in particular, is on the increase, Commerce Dept. discloses.

Stockpile activities of the Government are expected to drop sharply after June 30, 1956, when most of the minimum goals are reached, and procurement for the long-range stockpile will proceed slowly. Office of Defense Mobilization says the Government will spend about $1.1 billion in the next 17 months for stockpile purchases.

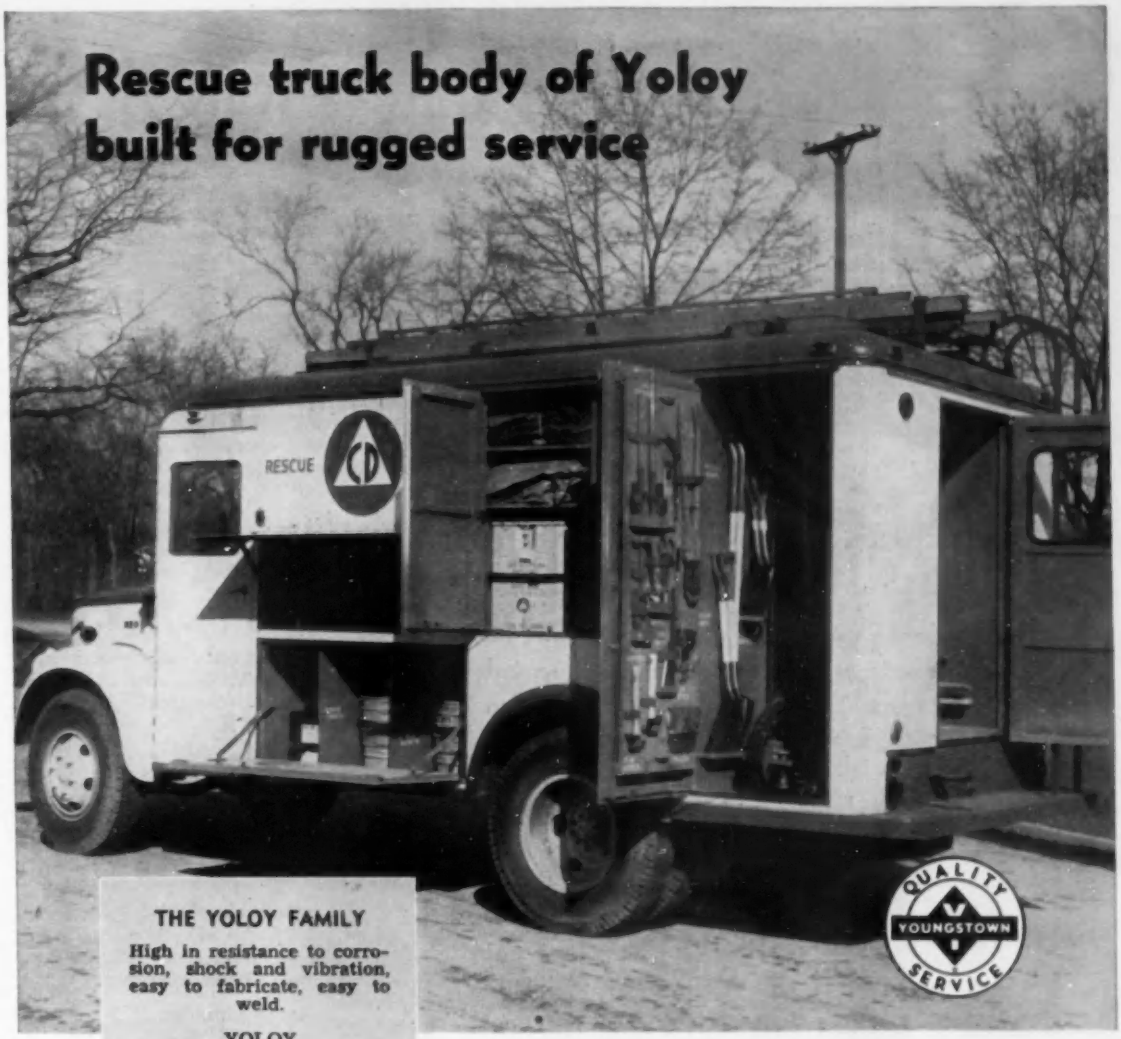
Confident consumers are apparently willing to spend more this year for the new cars they want. Federal Reserve Board says the median planned outlay for a new model is $2800, or $300 more than buyers expected to spend in 1954.

Improved testing methods used in Government-sponsored metallurgical research are described in two new publications sold by the Office of Technical Services, U. S. Commerce Dept., Washington 25, D. C. The first, **Fundamentals of Brazing,** tells of the utilization of high-frequency induction heating as a fast means of brazing. Code number of this publication is PB 111509, and it sells for $3.50 per copy. **Causes of Cracking in High-Strength Weld Metals** (Part I) describes special techniques and apparatus for testing hot strength and ductility of certain materials. This report (Code No. 111531) is priced at $1.25 per copy.

Operating profits of new car and truck dealers were down to 0.6 pct in 1954. This made last year the worst for profits since 1939, National Automobile Dealers Association states.

Gasoline and oil tax bill paid by U. S. motorists is expected to get higher. At least eight states are thinking of boosting these taxes. In 1953, state and Federal levies amounted to more than $3 billion. The 1954 increase probably was at least four per cent.

Rescue truck body of Yoloy built for rugged service



THE YOLOY FAMILY

High in resistance to corrosion, shock and vibration, easy to fabricate, easy to weld.

YOLOY
(Nickel-Copper)
Low Alloy High Strength Steel

YOLOY E
(Nickel-Chrome-Copper)
Low Alloy High Strength Steel

YOLOY M
(Manganese-Copper)
High Strength Steel

This civil defense truck must be ready to go under all conditions. To overcome unforeseen emergencies the Yoloy Family of steels is used advantageously in the construction of its all steel body.

The Yoloy Family of high strength steels have proven themselves to be extra ordinarily tough resistant to corrosion abrasion and wear. Their extra strength permits lighter construction with consequent valuable reduction in dead weight. That's why Swift All-Steel Body Co., Inc., Saginaw, Michigan, specified Yoloy "M" and Yoloy "E" for the light, strong body framing in this rescue truck.

Our District Sales Office near you is ready to supply information and service on the specific steels in the Yoloy Family best fitted to meet your requirements.

Youngstown

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon Alloy and Yoloy Steel*

General Offices: Youngstown, Ohio - District Sales Offices in Principal Cities

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES

SHORTIES

The iron and steel industry includes 255 companies, which operate 430 plants in 270 communities in 31 states.

•

A major aircraft manufacturer saved $32,500 through use of a plastic assembly in place of a sheet metal assembly.

•

An automobile engine develops enough heat during operation to keep a six-room house warm in zero weather.

•

One modern bomber carries a million times the punch of all the B-17's that bombed Berlin in World War II.

•

A new gyroscope for planes can detect motion 3000 times slower than the movement of the hour hand on a watch.

•

A single-stage American rocket has flown an estimated 4300 miles an hour and reached an altitude of approximately 834,240 ft.

•

A three-lb mechanism which actuates trim tabs, moving rudder and ailerons, on a modern plane can produce a force equal to 100 times its own weight. If a man had that weight-to-power ratio he could lift five automobiles.

•

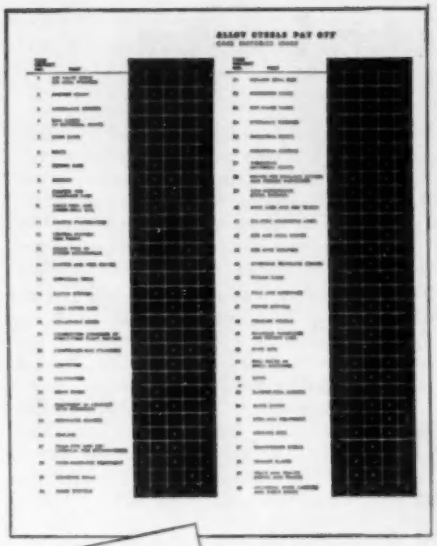
More than 200 reinforced-plastic parts go into a sweptwing jet fighter-bomber.

•

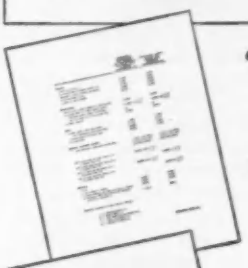
Today a gallon of oil, weighing seven lb, can be moved from well to consumer for less than it costs to mail a one-ounce letter.

•

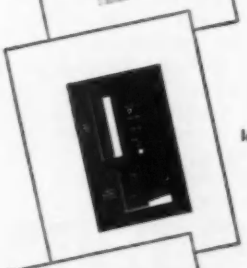
Flying time between overhauls on a typical jet engine has increased more than 80 times in the past five years.



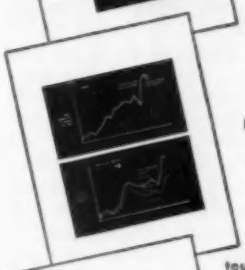
60 fully documented case histories



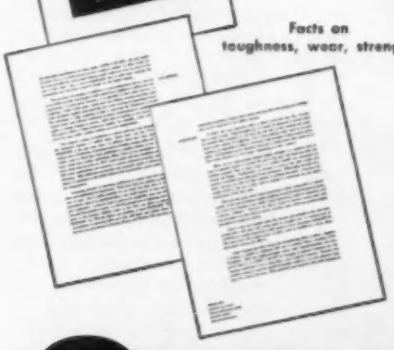
Facts on maximum pay load



Facts on lower operating costs



Facts on lower corrosion rate



Facts on toughness, wear, strength

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Company_____

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If you use steels, here's the handbook you should have

This fact-packed handbook is a must for you if you use steel. Here, in completely documented form, you'll find how the use of alloy steels adds economies, increases service life, offers many other advantages.* Cost-conscious executives will find the full story on these economies of alloy steel in the first section of the handbook. Designers and metallurgists will find the advantages of alloy steels in the 60 case histories. Get your copy today. Climax Molybdenum Company, 500 Fifth Avenue, New York 36, N. Y.

MSS-18

***Advantages of ALLOY STEELS**

- longer life
- greater pay load
- lower operating costs
- greater safety
- less maintenance

CLIMAX MOLYBDENUM

ASTE Annual Meeting and Western Exposition

(*Continued from page* 100)

material. He said stress-strain curves provide the most useful help in selecting tooling material. L. E. Frost, North American Aviation, Inc., showed slides of some recent uses of various types of plastics, such as a stretch die over-lid of phenolic to partially clamp a part after the initial stretch; draw die surfaces of phenolic to handle 75S aluminum, ¼ hard stainless steel and pure titanium; drop hammer punches of ethel cellulose; a male stretch die for a complicated corrugated duct section, with an epoxy surface made by a double-duplication process, and a correspondingly matched die for resizing using the stretch die as a punch. A process for making reinforced laminate tooling was outlined by Richard Morozowicz, Douglas Aircraft Co. He listed spotweld fixtures, Keller patterns, assembly jigs, and applied trim and drill fixtures as important applications. Morozowicz and G. C. Adams, Rezolin, Inc., called for plastic standards to be developed for data on physical properties, procedures, design, operation and storage.

Fixtures of magnesium are coming into wider use, according to R. L. Nelson, Dow Chemical Co. At the first technical session, he showed slides of fixtures for checking automobile chassis frames, window frames and small formed parts. A front grille assembly jig, low production welding fixtures, an aircraft cowling assembling jig, and several others also were shown.

Clamped chip breakers, a separate part clamped on top of the cutting tool, offer economies in expensive materials as well as consistent performance, said E. K. Henriksen, University of Missouri. He presented results of experiments as well as design data for clamped breakers.

Advantages to leasing production equipment include conservation of working capital, avoidance of early obsolescence, and inexpensive tryout of new processes. R. A. Perkins of Kearney & Trecker Corp. said the real savings from leasing are observed in replacing outmoded equipment, rather than in comparing the cost of purchase vs. leasing.

A case history in the use of automatic gaging was presented by W. F. Aller of Sheffield Corp. He covered many of the principles of automation in gaging by the example of a modern ball bearing production line. Effective gear inspection, according to Fred Bohle of Illinois Tool Works, is increasingly complicated but can often permit smaller, more economical gears. Bohle outlined modern automatic gaging practices, pointing out how functional gages measuring dimensions are the policemen, while analytical checkers are the judges.

Machine tools were discussed generally and specifically. Rolled flow formed toothed parts exhibit a surface smoothness of three to six microinches, and the process operates with a minimum of downtime, stated Harry Pelphrey, of Michigan Tool Co. He explained the theory and operation of the Roto-Flo process for axle and drive shafts, torsion bars, transmission sliding parts and simi-

(*Turn to page* 170, *please*)

Next time you design a part—stop and think—

CAN IT BE BETTER MADE WITH ALUMINUM?

EACH of the 20 parts shown above can be better made with aluminum because aluminum offers unique properties in many different combinations.

For example, aluminum's corrosion resistance adds longer life. Aluminum's ability to conduct heat readily is invaluable in handling increased temperatures. Combined with its great weight saving advantage, aluminum aids designers in meeting the demands of today's power-conscious public.

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Choose *ElectroniK* Strip Chart Controllers for detailed, long-term records . . . and a selection of control forms including electric systems of the contact, position-proportioning (*Electr-O-Line*) and time-proportioning (*Electr-O-Pulse*) types; and pneumatic control from two-position to full proportional-plus-reset-plus-rate action.

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Note: the basic components of all *ElectroniK* models are interchangeable . . . to simplify and speed up service.

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Choose *Pyr-O-Vane* Controllers where you don't need a record but do need precise vane type snap action electric control by a millivoltmeter instrument . . . also available with pulse-type time proportioning action, in both vertical and horizontal models.

Choose *Protect-O-Vane* Controllers for simple, dependable excess temperature cut-off protection . . . can be used with any temperature control to prevent furnace shut downs and loss of production.

• • •

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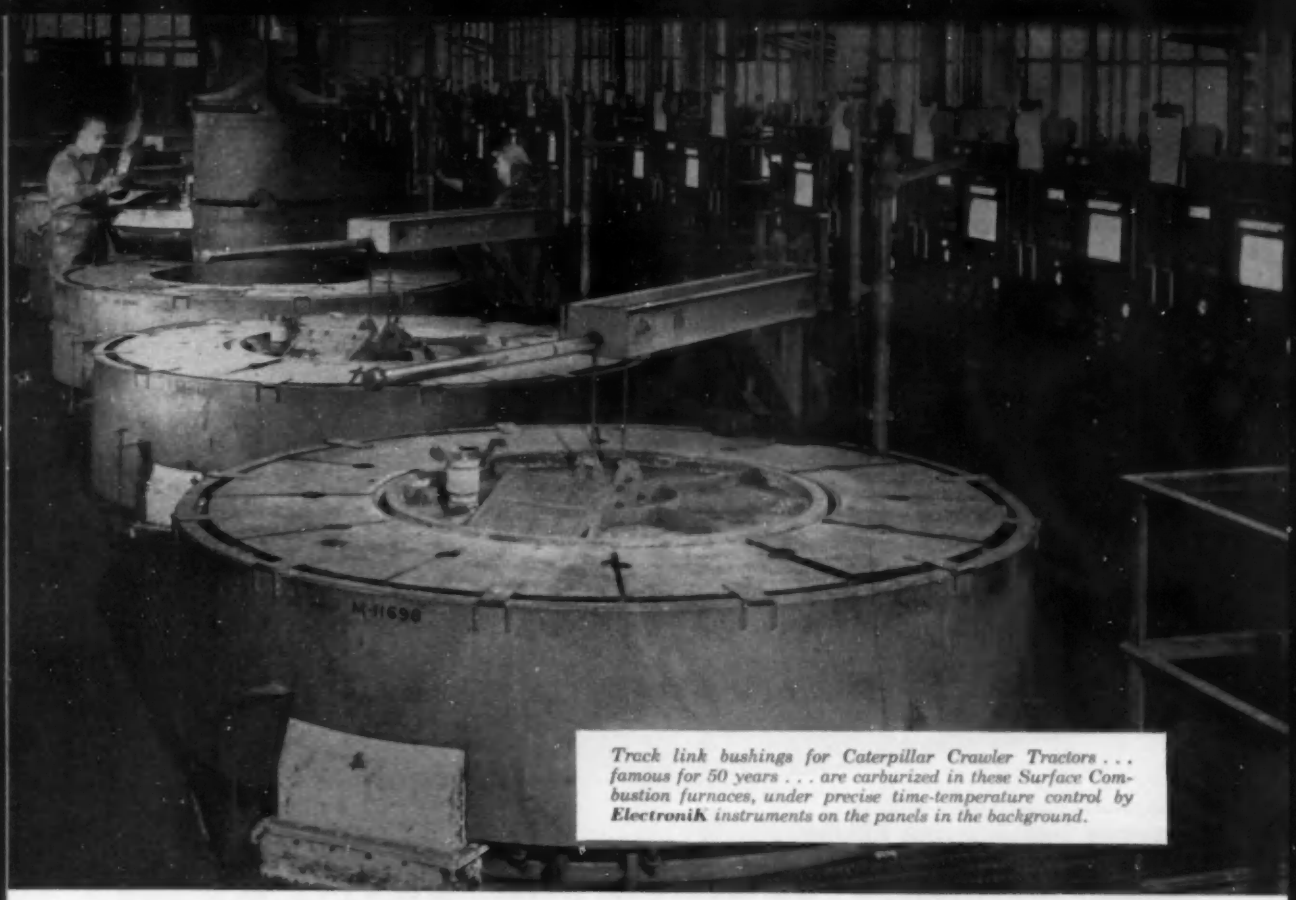
Flexibility for parts carburizing at Caterpillar®— in *ElectroniK*-

Detailed information on all Brown instruments for regulating heat-treating equipment is contained in Catalog 54-1, "Furnace and Oven Controls" . . . complete with up-to-date prices. Write for your copy today . . . or get one from your local Honeywell sales engineer next time he calls.



Track link bushings for Caterpillar Crawler Tractors . . . famous for 50 years . . . are carburized in these Surface Combustion furnaces, under precise time-temperature control by ***ElectroniK*** *instruments on the panels in the background.*

controlled Surface pit furnaces

HIGH QUALITY carburizing at high production rates —this is the goal that is achieved at Caterpillar Tractor Co. Eighteen pit-type Surface Combustion furnaces carburize more than 400 tons of track link bushings every week, to strict specifications that insure long service life.

The control system for each furnace is engineered to give both the precision and the high degree of control essential to volume production. The system with *ElectroniK* Controllers regulates fuel input to the radiant-tube burners and conducts the furnaces through preset time-temperature programs. Purge, equalizing, carburizing, diffusion and cooling periods are automatically followed . . . and are readily changed when required to meet various carburizing specifications. At each change point in the cycle, signal lights inform the operator of the progress of the furnace charge.

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● **REFERENCE DATA:** Write for Catalog 1531, "*ElectroniK* Controllers," and for Catalog 54-1, "Furnace and Oven Controls."

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls

ASTE Meeting and Exposition

(*Continued from page* 166)

lar pieces. D. E. Hawkinson of Greenlee Brothers, discussing the selection of machine tools, said that thinking in terms of "standard versus special" is the wrong approach. The problem is to consider production requirements, machine procurement time, length of run, and the nature of the workpiece, he explained.

The process of frozen mercury investment casting was explained by Dr. I. R. Kramer of Mercast Corp. Properties and uses of ceramic parts were outlined by R. F. Rea of Stupakoff Ceramic & Mfg. Div. of Carborundum Co. Mechanical applications of ceramics include gages of several types, in which the cost to make is the same but life is many times greater than for a similar steel gage. Others, some still in the future, are surface plates, bearings, cutting tool tips, rotary shaft seals, extrusion dies, and welding and brazing jigs, Rea explained.

BOOKS . . .

ASTM STANDARDS ON COPPER AND COPPER ALLOYS, *published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price $5.00.* This book brings together in compact, readily usable form all of the ASTM Standards pertaining to copper and copper alloys, which were developed by ASTM Committee B-5 on Copper and Copper Alloys, Cast and Wrought, and related standards from other ASTM committees. This edition includes in their latest form 123 ASTM standards, including 108 specifications; 10 test methods; two classifications: one of coppers, the other of cast copper-base alloys; two recommended practices: one for tension test specimens for copper-base alloys for sand castings, and one for designating significant places in specified limiting values; and one hardness conversion table for cartridge brass. In this special compilation, 50 of the specifications included in the earlier edition have been revised and eight of the standards are new.

ENGINEERING DYNAMICS, *by C. B. Biezeno and R. Grammel, published by Blackie & Sons, Ltd., 17 Stanhope St., Glasgow, Scotland. Price, $7.00.* Textbooks as well as elementary lecture courses covering the syllabus of engineering mechanics have to attach primary importance to simplified, rather academic, problems. For want of space and time, the more difficult problems met in engineering practice are either omitted or cannot be treated as fully as would be required in actual practice. For this reason, most Technical Colleges have instituted special courses in Higher Mechanics dealing with the more complicated problems encountered by the practical designer or research engineer. This book is intended to serve a purpose similar to that of these special lectures.

Here's big news to *Stainless* users—especially those in the jet engine and automotive fields. From Disston—leaders for 100 years in the rolling of special shapes—comes a new specialized skill to help you solve rising costs of metal shaping. After years of experimentation and over a year of volume deliveries, Disston is ready to supply complex *stainless* steel shapes to *your* specifications.

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in special purpose steels and special steel shapes.

Swiss Show

(*Continued from page* 53)

new 600 model. Special coachwork presented included Deluxe versions of the standard two door four passenger sedan and specially designed coupes.

Among the examples of special Swiss coachwork, six very smart cars —five Alvis three-litre and one Bentley Continental — were shown by Graber. Features were low overall height, comfortable individual seats, and very slim windshield posts. An outstanding body was presented by Ghia-Aigle, designed by Giovanni Michelotti of Turin, a stylist who is responsible for many Italian and Swiss special bodies. Italian coachwork innovations included some imaginative designs by Pinin Farina and by Ghia and a new Alfa Romeo coupe by Touring. Major developments, however, are kept back until the Turin show, starting on April 20.

Among the commercial vehicles, the Swiss firm of Saurer presented an underfloor engine series fitted with their own mechanical supercharger. For cross-country work and for indifferent road surfaces, a lockable differential can be fitted. The Morris commercial range has been supplemented by new models of 3.5 and 5 tons fitted with three-passenger cabs. For the 3.5 ton model a 58 hp Diesel engine or a 68 hp gasoline power unit, both stemming from the B.M.C. range, are available. A new 5.1 litre 90 hp six cylinder Diesel engine has been developed for the 5 ton trucks.

Most German truck firms now have 4x4 models in their programs, and the latest addition is the Hanomag 1.5 ton Diesel truck. These models usually have duplicated drive units and conventional springing fore and aft. The new Porsche cross country vehicle was shown for the first time.

BOOKS . . .

FIFTY YEARS ON TRACKS, *published by Caterpillar Tractor Co., Peoria, Ill. Price, $1.25.* This book tells a portion of history that has never been told before in one volume—the story of the track-type tractor. It relates what led to the crawler's conception 50 years ago and the important work it has done in three wars, in road-building, in agriculture, in logging, in mining, and many other industries which have played such vital roles in our country's—and the world's—development. This volume also describes Caterpillar's present operations and the many machines the company makes besides track-type tractors.

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How many times have you asked this question? A simple part, an assembly or a finished product — why should it cost so much to make? Why? Maybe one answer is so obvious it's being overlooked.

This may be an answer

Invisible cracks developing in parts during manufacture are too often the cause of these high costs. It isn't the cost of the rough parts themselves. It's the time and labor that go into them . . . setting up, machining, finishing . . . all to be scrapped at final inspection.

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The BUSINESS PULSE

(*Continued from page 96*)

Earlier Caution

Predictions made last fall with regard to the performance of specific indicators veered on the side of caution. Steel producers, for example, did not seem to be counting on an average production rate for the fourth quarter of much more than 70 per cent. And as analysts tried to peer ahead into 1955, they could see the likelihood of a mild uptrend in general business, although the tendency was to underscore the possibility of some backsliding in the second half of the year. For 1955 as a whole, it was considered doubtful that the peak 1953 rate in industrial production (137 per cent of the 1947-49 average in May and July) or in gross national product ($369.9 billion in the second quarter) would be exceeded.

When measured against these anticipations, the actual course of business since last fall appears very satisfactory.

Fast Recovery

To begin with, the recovery has been appreciably sharper than was generally anticipated. Steel production rose only moderately above the 70 per cent mark in October, but in the final two months of 1954 it ran close to 80 per cent; and gains have persisted thus far in 1955, so that the recent rate has been comfortably above 90 per cent. Over-all industrial production began to rise sharply last October, and the uptrend has continued right down to the present. The Federal Reserve's seasonally adjusted index ran at 133 per cent of its 1947-49 average in February, 10 full points above last summer's low and only four points below the 1953 peak, which, as noted, most people did not think would be matched at any time in 1955. Gross national product has similarly staged an impressive recovery. In the fourth quarter of 1954, GNP rose to a seasonally adjusted annual rate of $362 billion. This was $6½ billion higher than its recessionary low of $355 billion in the third quarter. No official estimates are as yet available for the first quarter of 1955, but some further rise certainly occurred, and indeed the chances are that at present GNP is running close to the all-time peak set in the second quarter of 1953, a mark which, to repeat,

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Stimulating new booklet shows how Mullins *Koldflo** process extrudes precision steel parts! Send now for this new 20-page booklet about cold steel extrusion by Mullins *Koldflo*. It shows you how to design intricate cylindrical steel parts for one-piece production. Parts with a glass-smooth bore, extremely close tolerances. Parts that are better designed and cost less to produce. For your free copy fill out and send the coupon now. Or call our nearest district sales engineering office: New York, 500 Fifth Avenue, Phone—Pennsylvania 6-2773; Detroit, 18268 James Couzens Highway, Phone—Diamond 1-1490; Chicago, 332 South Michigan Ave., Phone—Harrison 7-3725.

*Trade Mark

Typical hydraulic cylinder produced by Mullins Koldflo* process. Length 15 inches, I.D. 2¼ inches.

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Warren, Ohio

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many people did not expect to see reached at any time during 1955.

Contributing Factors

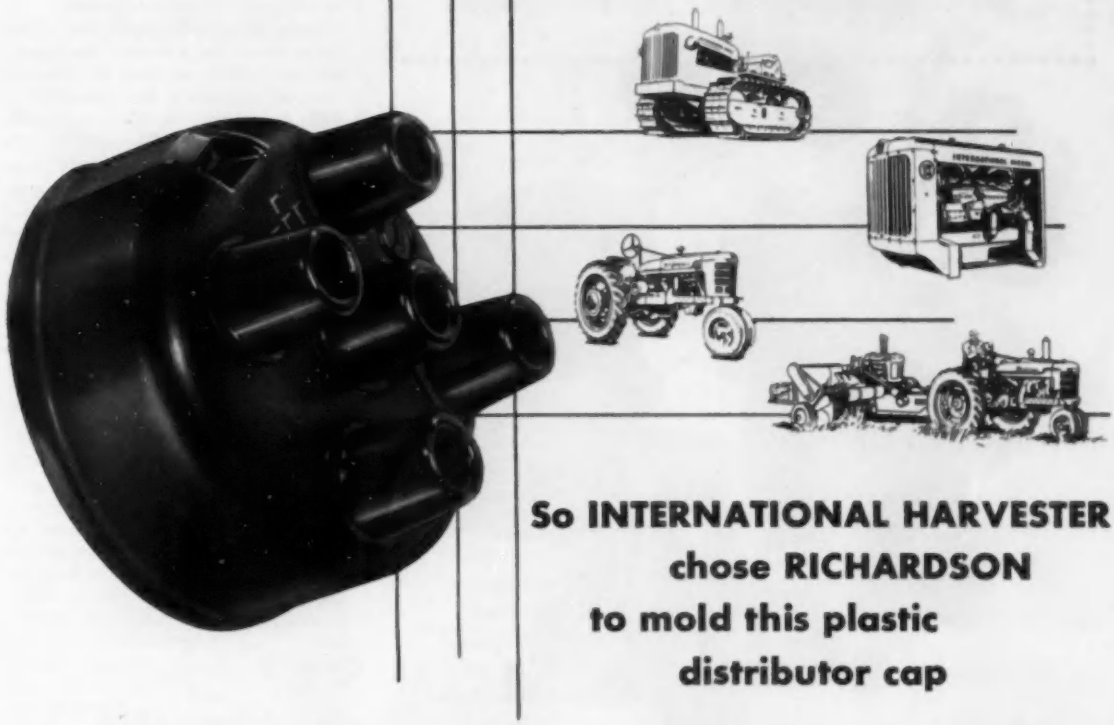
What factors account for this unexpectedly sharp rise in general business? One of the most important certainly is the acceleration in building activity. It was clearly realized last fall that building was characterized by boom conditions, but what was not sufficiently appreciated was that the crest had by no means been reached. Whereas most analysts would probably have considered it a creditable performance if construction activity had merely held its own, what actually happened was that, on a seasonally adjusted basis, total activity rose by nine per cent from October of last year to February of this year.

Another factor in the unexpectedly marked rise of business is the enthusiastic reception of 1955-model automobiles by consumers. Sales have been running at truly astounding levels since last autumn, with the result that production sights have been raised in the interim, whereas earlier the fear had been that by this time the industry position would be weakening. Automobile production is currently aimed at a record-breaking four million units for the first half of the year.

While the automobile experience has been the most important single sales phenomenon of the past six months, non-automotive trade has also given an excellent account of itself. Its contribution to the greater-than-expected rise of general business is of the most fundamental importance. On a seasonally adjusted basis, total retail sales appear recently to have run four to five per cent greater than in the third quarter of 1954, and more than half of this gain is accounted for by sales other than automotive. This favorable sales pattern reflects three things: incomes have risen since last summer, more credit is being used, and the rate of savings has declined.

When the various component parts of the Federal Reserve's index are examined, the thing that becomes immediately apparent is that a broad range of industries, not just a few, have contributed to the business uptrend. And what is particularly encouraging is that some of those which made only a very modest contribution to the upswing between last autumn and the early weeks of 1955 have recently shown evidence of rising momentum. Two prime examples are

they had to be certain...



So INTERNATIONAL HARVESTER chose RICHARDSON to mold this plastic distributor cap

When a manufacturer like International Harvester uses a part for all the tractors, power units, and implements it produces—the figure runs into hundreds of thousands a year. And because each part has to conform to rigid I-H engineering specifications—it has to be *right*, too!

Obviously, I-H must turn to a plastics molder who has facilities for large-scale production and who can offer precision molding skill and the assurance of uniform quality combined with delivery as scheduled.

And that's why Richardson was selected to mold this plastic distributor cap.

For a quarter century, Richardson has been handling the "tough ones" for International Harvester. Why not turn to Richardson when you have a tough plastics job?

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The RICHARDSON COMPANY

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SALES OFFICES IN PRINCIPAL CITIES

the machinery and furniture industries, where new orders lately have risen appreciably.

Employment Rise Lags

Perhaps the most disappointing aspect of the revival to date has been the failure of employment to reflect fully the rise in production. Employment in non-agricultural industries has risen to some extent, of course, on a seasonally adjusted basis, and new unemployment (as measured by weekly claims for unemployment insurance benefits) has fallen off substantially. But these gains have not matched the expansion of output, so that whereas industrial production has recently run well above that in the comparable months of 1954, employment is still lagging. This disparity between gains in output and employment appears to be explained by a combination of three factors: employment did not fall as much as did output during the business decline of 1953-54; businessmen have shown a tendency to lengthen the work week in preference to hiring new workers since the uptrend began; and technological changes may have temporarily displaced some workers.

Despite this disappointing experience in employment—and it is only disappointing in the light of the surprisingly sharp uptrend in business during the past six months, not as compared with last fall's anticipations — business sentiment has unquestionably improved as a consequence of the broadening of the upswing. This improvement in sentiment was greatly helped, moreover, by the recent unveiling of two very favorable sets of foreshadowing statistics.

Favorable Statistics

First, the tenth annual survey of consumer intentions (conducted for the Federal Reserve Board by the University of Michigan) confirmed the many market indications of an increase in consumers' willingness to buy. In January and February, when the survey was conducted, consumers were much more optimistic about general business conditions than a year earlier, and because of this optimism they reported plans to increase their purchases of a wide range of durable goods this year. Plans to purchase new houses were sharply higher than a year earlier. The major disappointment of the survey was the revelation that intentions to purchase new cars are not quite as common this

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In all cases rigidity and precision of the machines is such that you can rely completely upon handwheel settings.

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Contains complete data on 7 new DoALL grinder models.

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Personalized Service...Complete Stocks...Local Delivery

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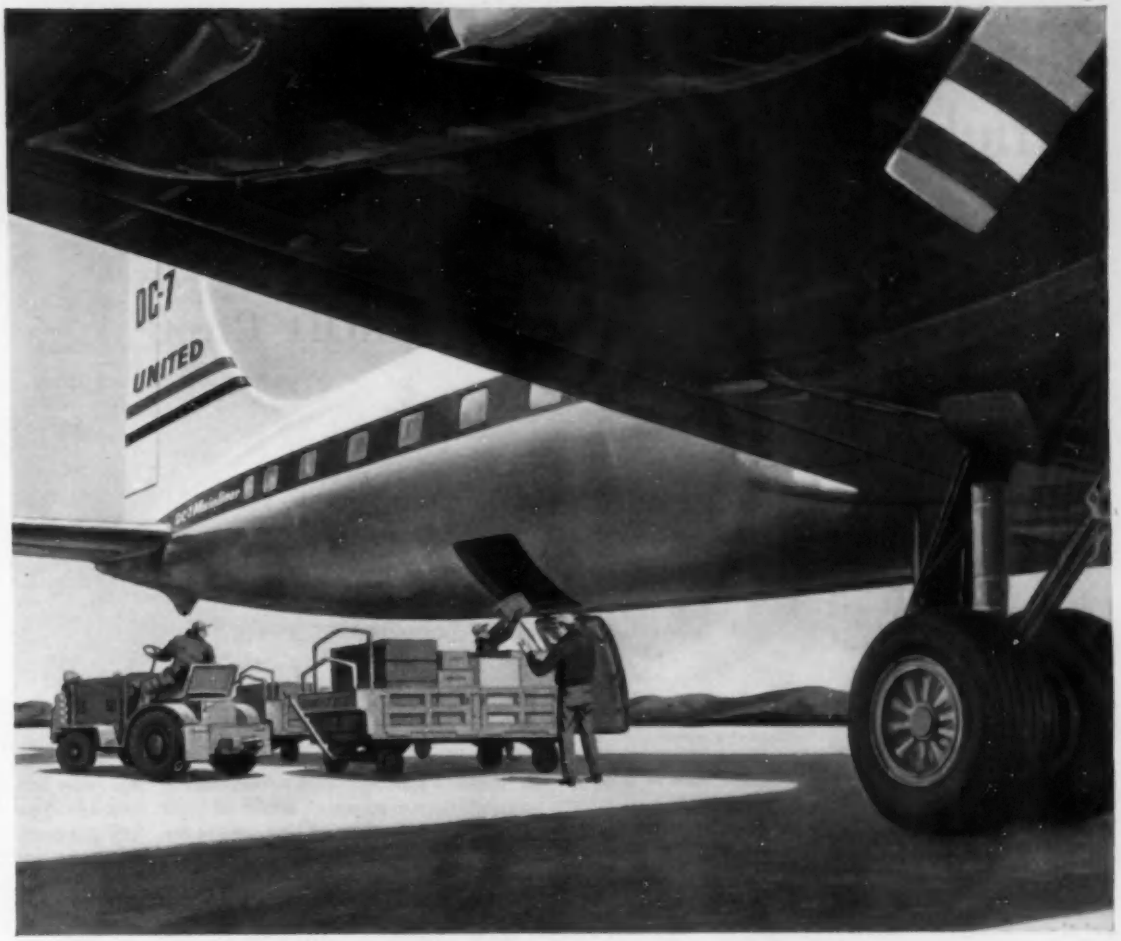
year as in 1954. There is some tendency to discount the significance of this aspect of the survey, however, since 1955 models had been on the market for several months when the survey was taken (so that some of those interviewed presumably had already purchased new cars), whereas in 1954 new models were presented to the public at about the same time the survey was conducted.

The second recent development that bolstered confidence was the joint announcement by the Department of Commerce and the Securities and Exchange Commission that present plans of American business call for greater capital outlay in 1955 than in 1954. The increase is not expected to be great, but for the time being the thing that is judged important is the apparent reversal of the year-old decline, since heretofore the common assumption has been that plant and equipment expenditure would continue on the downtrend throughout most and perhaps all of this year.

These favorable foreshadowing statistics, together with evidence that the boom is broadening, have engendered new optimism in business circles regarding prospects for the second half. Specifically, businessmen and economic analysts seem less inclined now to worry about the consequences of a decline in automobiles and construction later in the year, for many of them feel that there is good promise of other sustaining forces of appreciable importance.

BOOKS . . .

ASTM STANDARDS ON ADHESIVES, *published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, $1.75.* The latest edition of this compilation includes in their latest form 42 ASTM standards, including 34 test methods; four recommended practices: three for determining respectively the artificial (carbon-arc type) and natural light on the permanence of adhesives, strength development of adhesive bonds, the effect of moisture and temperature on adhesive bonds, and one for maintaining constant relative humidity by means of aqueous solutions; three definitions relating respectively to adhesives, methods of mechanical testing, and conditioning and weathering; and specifications for enclosures and servicing units for tests above and below room temperature. Sponsored by ASTM Committee D-14 on Adhesives, this book brings together all of the ASTM test methods, definitions, specifications, and recommended practices pertaining to adhesives. In addition to the test methods developed by Committee D-14, related standards have been included in the book as prepared by seven other committees of ASTM. Standards cover: adhesives, rubber cements, brake shoe adhesives and vulcanized rubber, electrical insulation, and other miscellaneous test methods and specifications.



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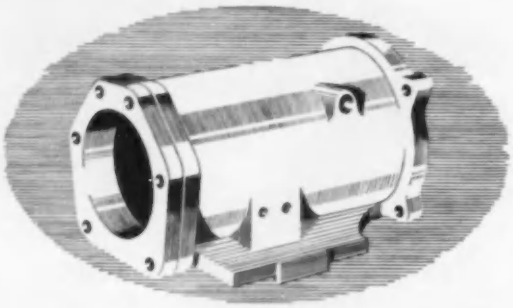
UNITED AIR LINES

How *ALCOA* would help you achieve the advantages of an *aluminum* transmission case



The other day a group of engineers from Detroit was looking over the facilities of our Cleveland Development Division. One of our visitors asked, "Suppose we were interested in developing an aluminum transmission case . . . how would you work with us?"

Because the answer explains so well how Alcoa works with the automotive industry, we present it here:

1. First we'd make sure that you knew the sound economic facts that suggest an aluminum transmission case. Weight reduction of 50 to 60 per cent compared to cast iron. Less load on the supporting structure. Easy machinability. Heat dissipation.

2. Then we'd suggest a joint meeting with your people to discuss your specific needs. The Alcoa engineers at the meeting would be men who know not only aluminum, but the ins and outs of transmission design.

3. Out of this meeting would come a definition of our joint responsibilities. Alcoa engineers would be assigned to explore in detail the adaptation of aluminum for your particular application.

4. Then design would start with your engineers supplying their detailed knowledge of your needs, your production processes and equipment—and ours supplying the practical solutions in aluminum.

5. We would suggest the Alcoa casting process best suited for the production of this part—an unbiased suggestion because we offer them all. But before making dies or molds, we'd make sand-cast samples for testing.

6. Both of us would want to give these castings the works in our test labs. Our own dynamometer, cold room and stress analysis equipment would be made available. You probably would want to add road tests. Any indicated changes in design would be made, new samples cast and the tests repeated. The first production castings from the die or mold would go through the same testing procedure.

7. We'd establish delivery dates you could count on for scheduling your assembly operations.

8. You'd get *quality* . . . very, very few rejects. We're able to enforce our quality rule because we have the most modern quality control devices in the industry.

* * *

Let us prove to you the advantages of an Alcoa-cast aluminum transmission case. Talk it over with an Alcoa sales engineer. Have him put these facilities to work on your problem—that's what our Development Division is for! Aluminum Company of America, 1841-D Alcoa Building, Mellon Square, Pittsburgh 19, Pa.

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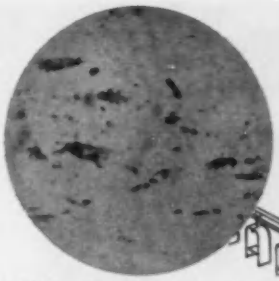
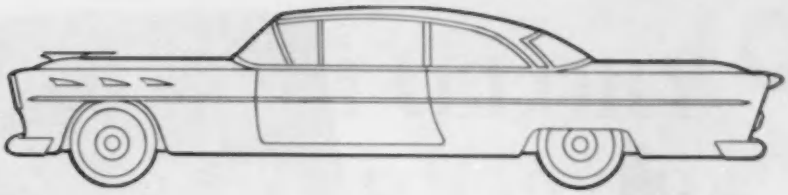
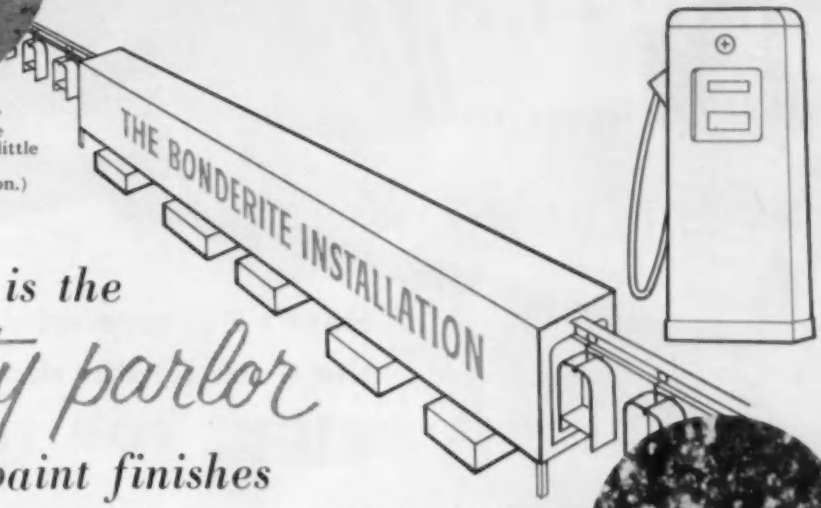


BEFORE BONDERITE . . .
Plain metal surfaces are smooth, slippery, offer little for paint to hang on to. (100 times magnification.)





This is the beauty parlor for fine paint finishes

AFTER BONDERITE . . .
Bonderite-treated metal has a fine, nonmetallic phosphate coated surface, takes and holds paint securely. (100 times magnification.)

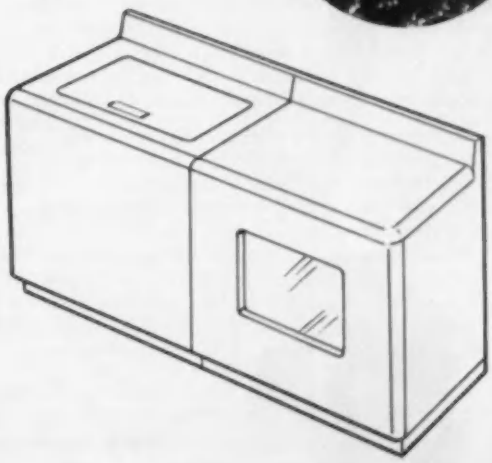
As the photomicrographs show, a trip through the Bonderite "beauty parlor" changes the surface of metal—changes it to a nonmetallic over all phosphate coating which is integral with the metal itself.

This coating protects and preserves beauty three ways: (1) by anchoring the paint, (2) by resisting rust and corrosion, and (3) by preventing the creep of finish failure if the paint film is scratched or broken.

The leading painted metal products in every classification, from automobiles and appliances to steel windows and x-ray equipment, are treated with Bonderite.

Your metal products, too, should all go through the Bonderite "beauty parlor" before they arrive at the paint booth. It's the economical, effective, *proven* way to assure lasting fine appearance for fine paint finishes.

Write for full information.



Since 1915—Leader in the Field

PARKER RUST PROOF COMPANY
2178 E. Milwaukee, Detroit 11, Michigan

PROTECTED BY Bonderite PARKER RUST PROOF CO. QUALITY CORROSION RESISTANT

BONDERITE corrosion resistant paint base | BONDERITE and BONDERLUBE aids in cold forming of metals | PARCO COMPOUND rust resistant | PARCO LUBRITE wear resistant for friction surfaces | TROPICAL heavy duty maintenance paints since 1883

Here's the sure way to get the truck heater that's

RIGHT FOR THE JOB!

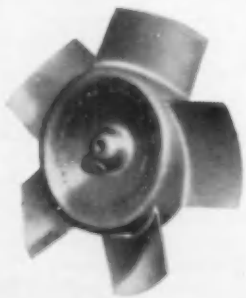
Before you specify *any* heater for your new truck models, be sure it's designed to deliver the BTU's needed to do the job *right*. A custom-built Evans heater will do the job *right* because it's designed to meet these special heating and engineering requirements of *your* trucks: size and design of cab . . . glass area . . . amount, type and placement of insulation and all other related factors.

Evans heater components, such as heavy duty motors, one piece die-cast aluminum fans and sturdy fin and tube type cores are perfectly balanced in design for *extra* performance and *longer* life. What's more, an Evans heater offers low-cost maintenance and easier service because it's built to fit your truck.

Each Evans heater has a parts "repair or replace" warranty for one year or 50,000 miles, whichever occurs first.

You'll benefit, especially in that important stage of designing a new model, by calling in Evans' engineers to work hand in hand with you. They'll design the right heater for *your* job, build the prototypes and test them to your complete satisfaction.

For free copy of new catalog, write: Evans Products Company, Dept. P-4, Plymouth, Michigan.



This is the exclusive, one-piece EVANAIR fan

. . . never loses its shape or balance. Precision die-molded in one piece, of aluminum alloy. Doesn't chip, crack or bend, has no parts to work loose. It's light . . . less than half the weight of ordinary fans, yet delivers more air with less vibration and motor wear!

EVANS
HEATERS AND VENTILATORS

. . . Complete truck and bus systems built right for the job

EVANS

REGIONAL REPRESENTATIVES: Cleveland, Frank A. Chase • Chicago, R. A. Lennox Co., Inc. • Detroit, Chas. F. Murray Sales Co. • Allentown, Pa., P. R. Weidner

New MALLORY VIBRATORS

set new standards for

LOW HUM LEVEL

The latest improvements in Mallory vibrators now offer designers the quietest operation ever available in a commercial vibrator. By means of a unique "floating" design, this new model thoroughly isolates the vibrator mechanism . . . minimizes transmission of mechanical hum and shake to the can or mounting base.

For the first time, mechanical noise has been reduced to a level lower than the speaker hum emitted by most automobile radio sets. The new design, furthermore, suppresses mechanical hum in *any* mounting position of the vibrator.

NO EXTRA COST. This new level of performance is available to you at the identical cost of previous Mallory vibrator models. The low-noise model now becomes the standard Mallory type, and in most instances carries the same part number. In addition, case size has been made more compact . . . affording valuable space savings in crowded circuits.

Mallory's experience is based on twenty-five years of pioneering research and development in the vibrator field, during which time we have supplied more vibrators for original equipment than all other makes combined. This experience is ready to serve you on your power supply design problems . . . to help you utilize the maximum qualities of Mallory low-noise-level vibrators. For engineering consultation, or for our Technical Bulletin, write or call us today.

Expect more...
Get more from
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IN POWER SUPPLIES BE SURE TO USE . . .
MALLORY FP Electrolytic Capacitors—The original fabricated plate capacitor, FP electrolytics have for many years been built for continuous operation at 85° C. . . . famous for long shelf and service life . . . with fast, twist-prong mounting.

Parts distributors in all major cities stock Mallory standard components for your convenience.

Serving Industry with These Products:
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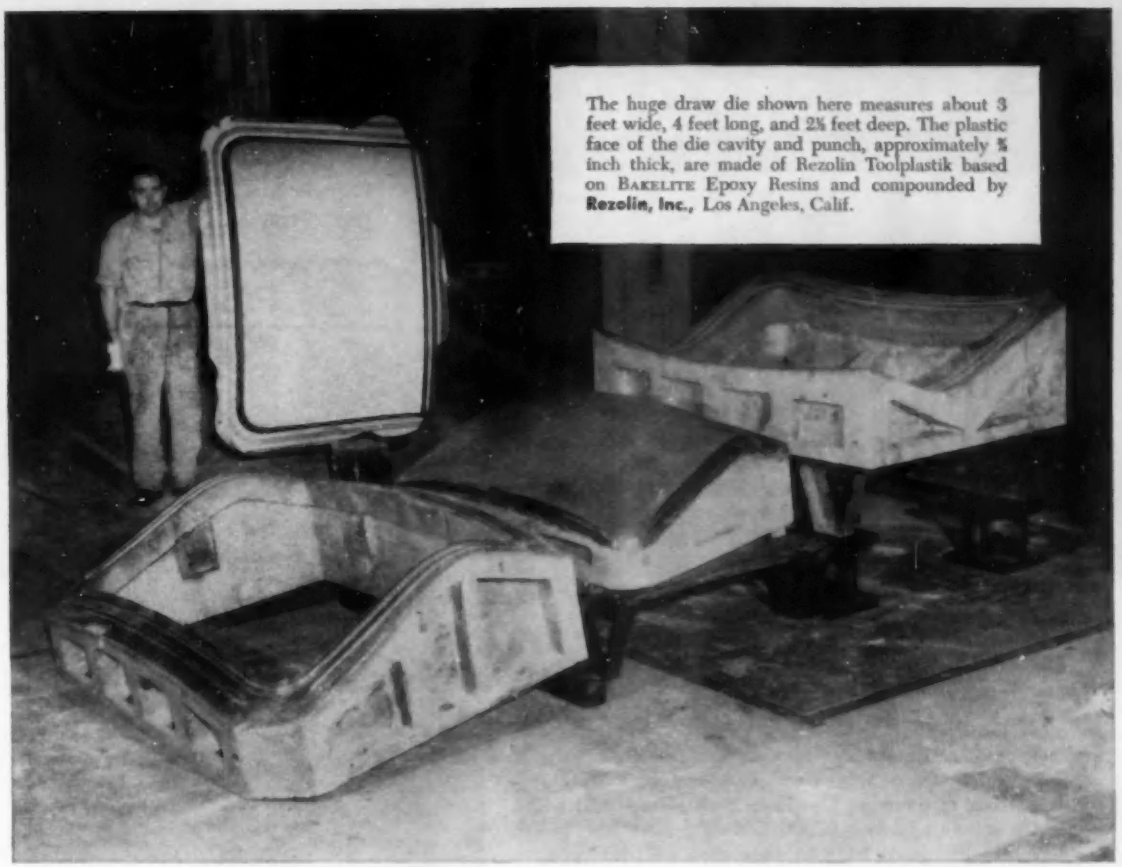

The huge draw die shown here measures about 3 feet wide, 4 feet long, and 2½ feet deep. The plastic face of the die cavity and punch, approximately ¾ inch thick, are made of Rezolin Toolplastik based on BAKELITE Epoxy Resins and compounded by **Rezolin, Inc.,** Los Angeles, Calif.

25% LESS COST—40% LESS TIME TO FACE THIS DIE WITH EPOXY RESINS

"Rezolin" tooling compounds, based on BAKELITE Brand Epoxy Resins, are liquid materials. Thus a simple casting operation formed this die face to the desired shape. By mixing the resin with a liquid hardener before pouring, it was cured at room temperature without applied heat or pressure. Shrinkage was so slight that finishing operations were kept to a minimum.

When cured, the epoxy resin compound is hard and tough, with excellent impact, compression, and flexural strengths. The face of this die is only ¾ in. thick, yet it stamps sheet steel into auto trunk lids. If design changes are needed, the surface can be readily machined or patched to fit new contours.

Jigs, spotting racks, checking fixtures, and Keller models are examples of other metalworking tools made with these compounds—usually by laminating with glass cloth. This construction results in excellent dimensional stability and accuracy. Tools are lighter and easier to handle than when made of conventional materials. They are strong and durable because of the hardness of BAKELITE Epoxy Resins when cured.

You'll benefit from the advantages of tooling with BAKELITE Epoxy Resins when speed is important . . . where model changes are frequent . . . when modifications in design are a factor . . . where a large variety of models demands a number of tools in a hurry. Take your first step toward efficient, up-to-date tooling with compounds based on BAKELITE Epoxy Resins.

BAKELITE BRAND EPOXY RESINS

BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N. Y.
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SENSATIONAL MILEAGE

STOPS! RING GROOVE WEAR

Double Bonded

METALLURGICALLY Al-Fin Bond

MECHANICALLY Zollner Lock

ZOLLNER

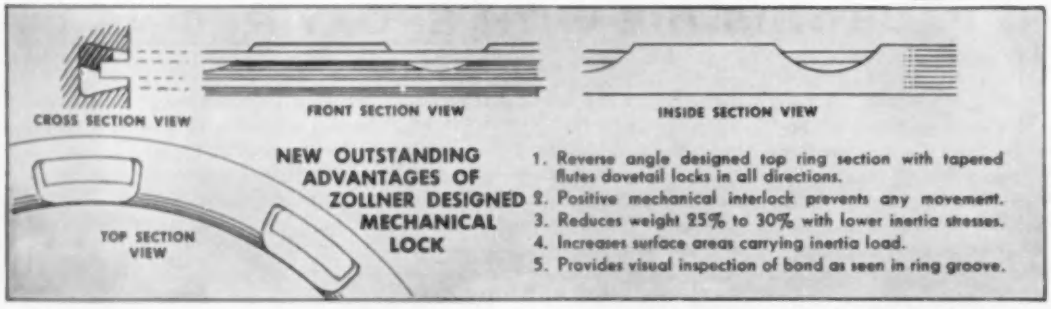
"Ni-Resist" Iron Top Ring Section

BOND LOC*

For Extra Heavy Duty Service

PISTONS

Up to 5 times more mileage is typical of this great new piston development by Zollner engineers. Designed for the most severe service, the BOND-O-LOC Piston has a "Ni-resist" iron top ring groove section *permanently* incorporated by *both* Al-Fin metallurgic bond and the exclusive Zollner mechanical lock. Separation failure is impossible. Reverse angles on every surface joining the "Ni-resist" iron section provide a multiple dovetail bond which is infinitely wedge-locked. Ring groove wear problems are eliminated, blow-by prevented, oil consumption reduced, mileage between overhauls greatly increased. Many heavy duty engine builders have already tested and approved BOND-O-LOC advantages. Request complete information, now.



NEW OUTSTANDING ADVANTAGES OF ZOLLNER DESIGNED MECHANICAL LOCK

1. Reverse angle designed top ring section with tapered flutes dovetail locks in all directions.
2. Positive mechanical interlock prevents any movement.
3. Reduces weight 25% to 30% with lower inertia stresses.
4. Increases surface areas carrying inertia load.
5. Provides visual inspection of bond as seen in ring groove.

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- ADVANCED ENGINEERING
- PRECISION PRODUCTION

in cooperation with engine builders

ZOLLNER PISTONS

THE ORIGINAL EQUIPMENT PISTONS

ZOLLNER

ZOLLNER MACHINE WORKS • Fort Wayne, Indiana

G-E COMBINATION WASHER-DRYER

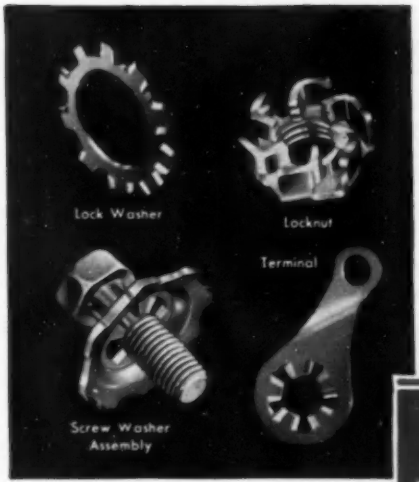
Washes and drys a full load of laundry completely automatically with a single loading—can be placed where it's most convenient. Only 30" wide, it fits under standard kitchen counter like a base cabinet—or can be built-in flush with a wall. As with so many G-E quality products, this new Combination Washer-Dryer uses EVERLOCK fasteners to hold vital parts secure against vibration.

AMF

Everlock®

fasteners . . .

used in NEW G-E Combination Washer-Dryer



For a bulldog bite that just won't let go, there's nothing quite like EVERLOCK lock washers. Note those exclusive alternating chisel-like edges. They bite right into the face of the work *and* the screw under powerful spring tension . . . hold snug and tight even under extreme conditions of jolting, jarring and vibration.

Next time you order lock washers, be sure you specify EVERLOCK. There are none better. EVERLOCK lock washers are made in a complete range of common sizes and types—to special order if you need them.

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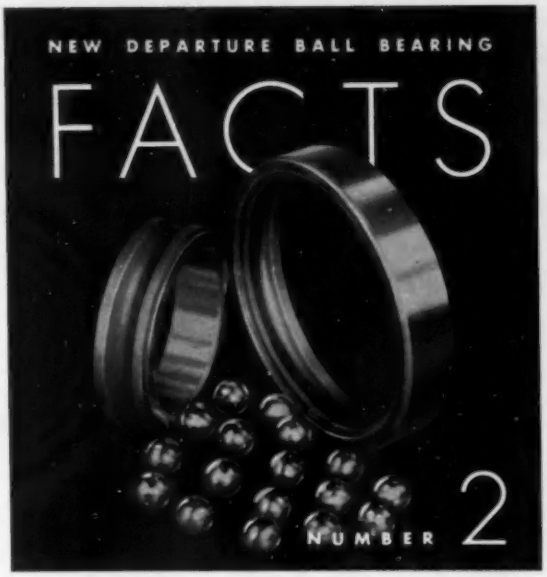
END MAINTENANCE PROBLEMS

with Bearings "Built to Be Forgotten!"



When machine design calls for bearings in inaccessible places, serious maintenance problems often arise. Disassembly for bearing replacement or adjustment is usually costly in both man-hours and lost production. Much the same holds true for many consumer products that must take use and abuse, yet operate efficiently over long periods.

BALL BEARINGS THE SOLUTION

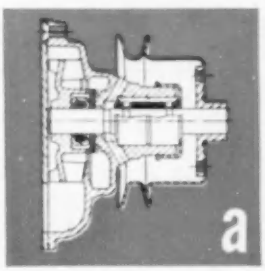
Fortunately, the engineer today has a ready answer at hand. Because of certain unique advantages, ball bearings are ideal in virtually all cases. Ball bearings are permanent, fixed units. When properly enclosed they operate over extremely long periods with practically no wear. Thus, the various parts of the bearing retain their accurate interrelationship. In effect, this means that ball bearings are the most practical of all anti-friction bearings to fit with permanent seals. Lubricant can be enclosed for lifetime operation in many services.

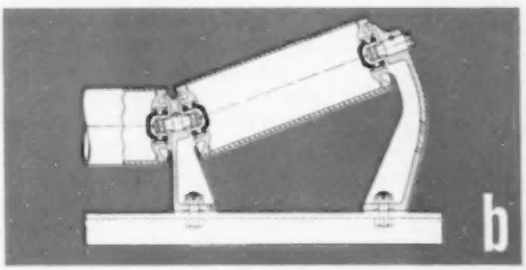
THE SEALED-FOR-LIFE BEARING

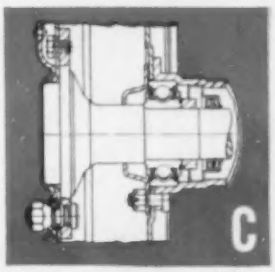
The most logical choice in applications such as those outlined is New Departure Sealed-for-Life bearings. This great advance in bearing design was originated and developed by New Departure. More than 266 million of these bearings have proved their value in service.

In case after case, New Departure Sealed-for-Life bearings have cut maintenance costs to the zero point. Truly, they are *"built to be forgotten"!*

Consult with New Departure on your bearing problems. You will find the experience gained through more than 50 years of designing, testing and manufacturing bearings a major assistance.







A. The automotive fan and pump shaft bearing originated by New Departure demonstrates advantages of the sealed-for-life principle. This bearing has eliminated all the old water pump troubles and service. It requires no relubrication or adjustment. It has proved that it is "built to be forgotten," through use in cars and trucks everywhere.

B. Conveyor roll units constructed around New Departure conveyor bearings require remarkably few parts. Bearings are sealed and lubricated for life. Savings in labor and lubricant are most pronounced. Units with these bearings are economical to produce and easy for the operator to set up. They also are "built to be forgotten."

C. The New Departure rear wheel bearing has made it possible for the engineer to design the simplest, strongest and most foolproof of mountings. This permanently sealed bearing requires no adjustment or relubrication. Grease gun fittings are eliminated. It is famous because it has demonstrated in millions of rear wheels that it needs no attention . . . it can be forgotten.

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONN.

Send for Booklet D-10 on sealed ball bearings

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BALL BEARINGS

NOTHING ROLLS LIKE A BALL